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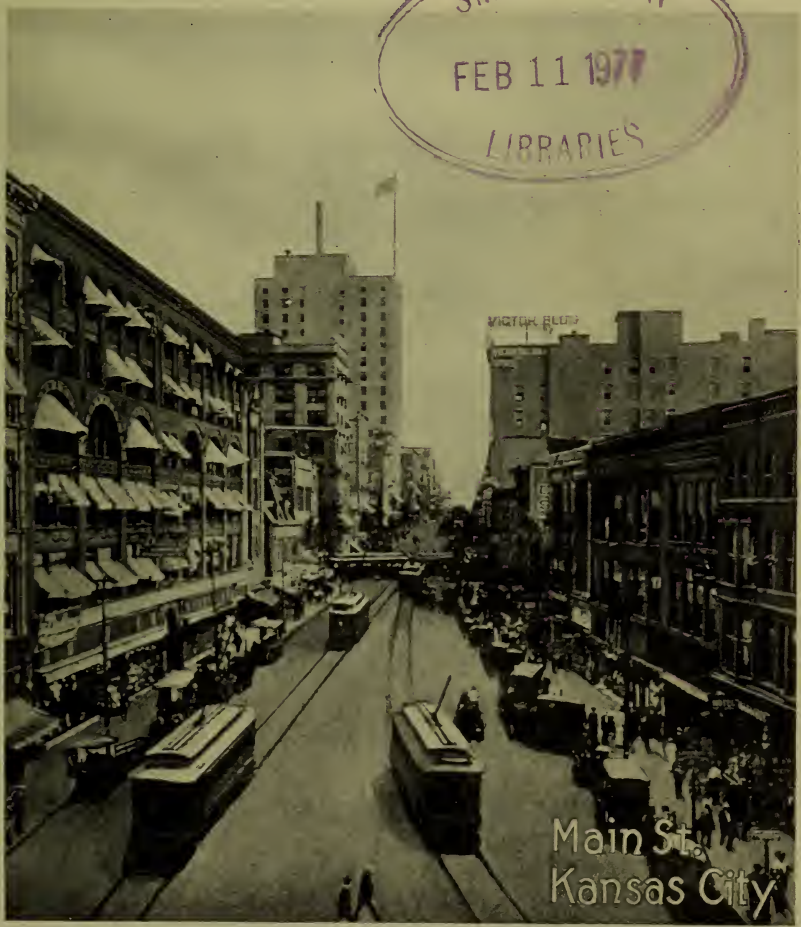
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VOL. 11 JANUARY, 1917 NO. 1

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BRILL MAGAZINE

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BRILL "RADIAX" TRUCK



A NUMBER of operations for which single-truck cars did not seem practicable because conditions made necessary the use of a larger car than could be mounted on the ordinary single truck now are using the economical single-truck car, thanks to the Brill "Radiax." This truck has a wheelbase which permits of its being used under a car with a seating capacity almost as great as that of the average double-truck car.

BRILL TWILL-WOVEN RATTAN

WORN, shabby, dirty-looking seats and seat backs, scarred and threadbare from long and hard usage, are more dangerous to public favor than perhaps any other one thing could be. That this is true is borne out by the fact that the seats and backs come into closer contact with the passengers than does any other part of the car. The clothes of the rider may *not* be in absolute danger of being soiled by a seat that is worn and shabby, but at any rate the psychological effect is there and a passenger leaving a car whose seats are in good repair certainly has a greater feeling of safety as to the condition of his clothes than would the passenger who has been transported in a car with badly worn seats. Brill twill-woven rattan is made in all widths and is made to give *service.*

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R. S. Stirke

City Electrical Engineer, Launceston, Australia

Always do things the right way; in doing them on the "near-enough" principle you trust very largely to luck, which at some future date may hit back.

Many of us are apt to give a lot of time to the discussion of matters which it is other people's business to know and carry out, and then wonder why, when the opportunity comes, we are passed over.

ROBERT JOHN STRIKE.

BRILL MAGAZINE

VOL. 11—NO. 1 Copyright, 1917, by The J. G. Brill Company, Philadelphia, U. S. A. JANUARY 15, 1917

ROBERT JOHN STRIKE

ROBERT JOHN STRIKE, city electrical engineer, Launceston, Australia, was born May 11, 1873, at Plymouth, England. He attended public school at Christchurch and Timaru, New Zealand, St. John's Church Grammar School, Christchurch, New Zealand, and the Government Technical College at Sydney, New South Wales. His first employment was in the capacity of assistant engineer at the Broken Hill Electric Light Station, which position he held from 1896 to 1899. In 1899 he became technical assistant, Launceston Hydro-Electric Supply. In 1901 he was mains engineer and technical assistant, and in 1907 he became city electrical engineer, Launceston Municipal Electrical Supply. In 1909 he entered the tramway field in the capacity of supervising engineer for construction of electric tramways, and in 1911 he became city electrical engineer in charge of corporation electric supply and electric tramways. Mr. Strike is an associate member of the Institute of Electrical Engineers, of London, and also of the American Institute of Electrical Engineers, of New York. He is a member of the Electrical Association of Australia and of the Northern Club of Launceston. He is on the board of management of the Launceston Mechanics Institute and Public Library and also of the Launceston Government Technical School.

Interurban Centers and Interurban Cars

KANSAS CITY

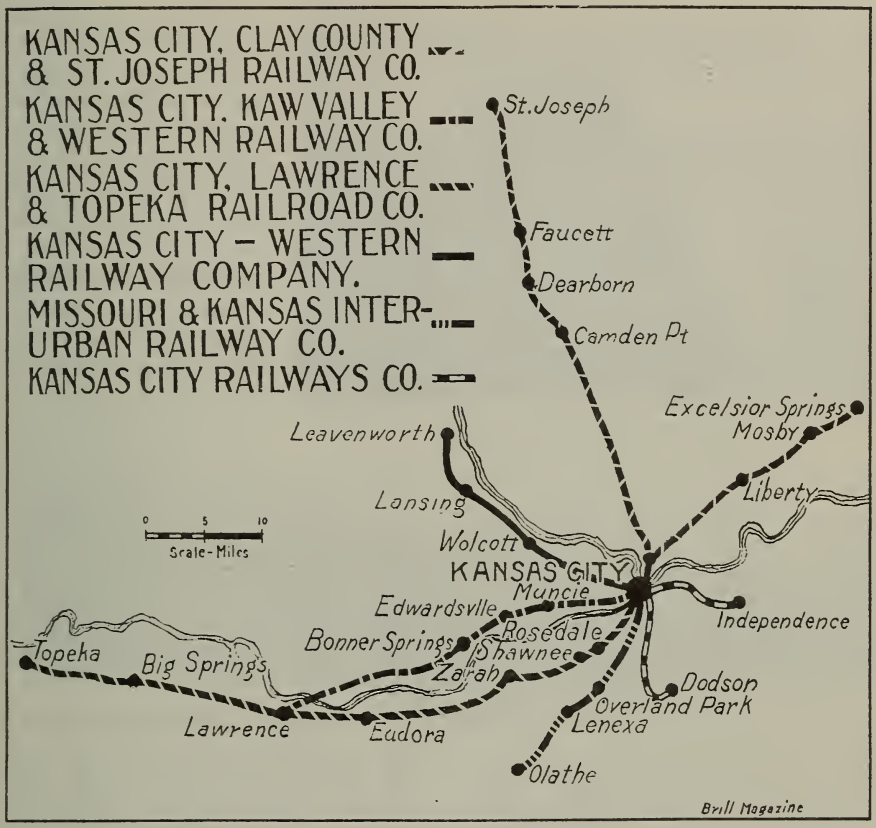


KANSAS CITY—second city Missouri — is located in the northwestern part of Jackson County, in the angle formed by the Kansas River at its junction with the Missouri. The name is derived from the Indian tribe that formerly occupied and owned much of this section of the country. The title of the Indians was completely obliterated in 1825 and the progress of the city since then has been rapid. The original site of Kansas City presented a rugged, precipitous and uninviting aspect, consisting mostly of high bluffs, composed chiefly of limestone, facing the Kansas River as it sweeps in from the southwest. Through these high bluffs, cut by deep ravines, in some places 200 feet deep, ran channels through which the water that fell on the upland flowed into the Missouri. Towering upward from the two rivers stood the precipitous bluffs with but a few hundred feet in width of bottom land upon which to begin a city. Persons who see Kansas City as it now is scarcely can realize the obstacles that had to be overcome in grading down streets to a level and in filling cuts.

From its earliest history as Westport Landing, Kansas City was noted for its steamboat traffic. It had one of the most permanent landings on the river—a rocky bank with a deep current in front of it. Here were landed goods for



INTERURBAN CENTERS AND INTERURBAN CARS. Main and Twelfth Streets, one of the busiest corners in the city



the Mexican and Indian trade west and southwest and in exchange were received the wool, furs, buffalo robes and other articles for the eastern market. Thirty years ago the attention of the metropolis was turned to the grain and produce market of the vast region about it. Since then the business has grown with a remarkable rapidity and has reached a great size. Kansas City is called the "greatest winter wheat market," and that name is known in foreign countries, to which millions of bushels of Kansas, Nebraska, Missouri and Oklahoma grain are annually shipped by Kansas City exporters. It is famous as a center for the accumulation of wheat, corn and oats and also as a distributing point for cereals to be consumed in the south, east and in foreign markets. The milling business is one of the city's most rapidly growing industries and enormous capital is involved in the transaction of this business and of the general grain business. In elevators alone the investment runs into millions of dollars. Besides, the stock yards are claimed to be

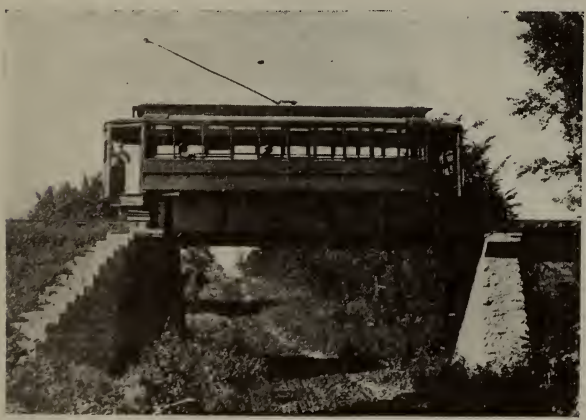


Interurban Centers and Cars. Bridge on lines of Kansas City, Lawrence & Topeka Railway

the most convenient for the quick and safe handling of stock in the United States. New manufacturing industries are springing up every year, due to the great deposits of bituminous coal in this vicinity and the abundance of raw material out of which so many products can be economically and rapidly manufactured.

Kansas City's interurban service is quite extensive, linking the city with three other important cities, namely, St. Joseph, Leavenworth and Topeka, as well as with other smaller and less important cities and towns. This interurban service is furnished by six railway companies operating out of Kansas City. They are the Kansas City, Clay County & St. Joseph Railway Company; the Kansas City Kaw Valley & Western Railway Company; the Kansas City, Lawrence & Topeka Railroad; the Kansas City-Western Railway Company; the Missouri & Kansas Interurban Railway Company and the Kansas City Railways Company.

The Kansas City-Western Railway Company operates suburban and Leavenworth City lines and connects the two cities, also linking together Kansas City, Kansas, and Kansas City, Missouri. The company operates thirty-five miles of single and nine miles of double track through a thickly-settled farming district. In addition to the rural population which is served by this line, the cities and towns along the route have a total population of about



Viaduct over Aldins Road—Kansas City, Lawrence & Topeka Railway

3,000, and, besides this, the company derives revenue from the 25,000 population of Leavenworth. The company makes connections with the Missouri Pacific at Walcott, Kansas, which is shown on the accompanying map as the first station outside of Kansas City, and with the Atchison, Topeka and Santa Fe Railway at Lansing, Kansas, which is the next station beyond Walcott on the accompanying map.

The company purchases power type and are operated singly but are equipped with multiple unit control so that they may be used for train operation if desired. They are mounted on Brill 27-E Trucks, equipped with four 75 horsepower motors. Normally the company operates its schedule with six passenger cars, but it has a total of eighteen cars available for operation.

Outside of the cities the lines are laid on a private right-of-way, which makes a maximum speed of



Interurban Centers and Cars. Steel trestle on Kansas City, Clay County & St. Joe Railway

for the operation of its line from the Metropolitan Street Railway Company, of Kansas City, the transmission voltage being 33,000. Substations for stepping down this voltage to the trolley voltage of 600 are located at Chelsea, Walcott and Leavenworth.

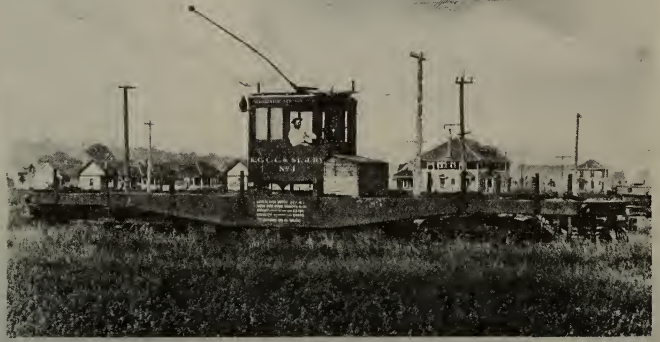
The standard car in use by the company measures 61 ft. 8 in. over the bumpers, 8 ft. 5½ in. over the side sheathing, has a seating capacity of 60, a weight of carbody including brake and electric equipment of 34,900 lb. and a total weight, car and trucks fully equipped, of 39,900 lb. The cars, built on wooden underframes, are of the semi-convertible single-end fifty miles per hour possible. The stops average one per mile, another feature which helps the speeding-up of schedules. The traffic statistics for last year show a total of 1,075,861 passengers carried. General freight business is carried on by the company.

The Kansas City Railways Company was organized in February, 1916, as a consolidation of all the properties owned by the Metropolitan Street Railway Company, Kansas City Elevated Railway Company, Central Electric Railway Company and the Kansas City and Westport Belt Railway Company. It controls all the lines of street railway in Kansas City,









KANSAS CITY, CLAY COUNTY & ST. JOE RAILWAY

Typical two-car train
Freight and express car

Standard steel baggage car
Work car

Missouri, Kansas City and Rosedale, Kansas, Independence, Missouri, and in the suburbs.

The line serves cities and towns of fair size. Independence has a population of 15,000, Rosedale a population of 9,000, Mt. Washington a population of 3,000 and Sheffield, 5,000. Altogether, including the populations of Kansas City, Kansas, and Kansas City, Missouri, the company has a total tributary population of 600,000. Connection is made with the Kansas City-Western; Kansas City, Lawrence and Topeka; Kansas City, Clay County and St. Joseph; and the Kansas City, Kaw Valley and Western. The company generates its own power and operates its lines with a trolley voltage of 600, stepped down from a transmission voltage of 6,600. The power plant, which is operated by steam, has a present capacity of 54,600 kw.

The car used by the company measures 46 ft. 9 in. over the bumpers, 8 ft. 6 in. over the side sheathing, has a seating capacity of 55 and a total weight, car and trucks fully equipped, of 47,300 lb. The car is built with steel sides on a steel underframe and for the most part is of single-end construction, 16 per cent, however, of the companies equipment being of the double-end type. Brill 27-G and 27-M. C. B. trucks are used. The cars are operated on the prepayment method of fare collection and are run singly except on two lines, upon which trailers are used. The line which runs to Dodson, shown on the accompanying map, handles freight consisting chiefly of lumber, coal, cement and groceries. Some little express business is done, but this is not so important as the freight business.

In normal operation, inclusive of course of the city system, there are 602 motors and 21 trail cars, there being, however, a total of 675 passenger cars available for use. Outside of the city private right-of-way is used exclusively. During the coming year it is purposed to complete a number of extensions to the line.

The Kansas City, Clay County and St. Joseph Railway Company operates between Kansas City and St. Joseph, Missouri, which latter city has a population of 90,000. Excelsior Springs, Missouri, the terminal of the other line of the company, has a population of 5,000 and the towns along the road, exclusive of the terminals, have a total population of 8,000 and the rural districts contribute 4,000 more. The company operates 78 miles of single track and 5 miles of double track.

The car used by the company measures 59 ft. over the bumpers, 9 ft. over the side sheathing, has a seating capacity of 66, a weight of carbody including electrical and brake equipment of 57,380 lb., and a total weight of car and trucks fully equipped of 78,980 lb. The cars, designed for double-end operation, are built on steel underframes with a side construction of steel. All cars are equipped with multiple unit control and may be operated singly or in trains. The company does a general express



Interurban Centers and Cars. Typical station on lines of Kansas City, Clay County & St. Joe Railway

business at steam railroad rates, consisting for the most part of less than carload shipments. Carload lots are handled. Railroad connection at Faucett, in conjunction with the C. G. W. Missouri. Express business also is handled at steam railroad rates, but the company does not make delivery.

Nine cars are used in normal operation, but the company has a total of 20 passenger cars available for use. Outside of the cities the line uses private right-of-way and, therefore, the company is able to accelerate its cars at a maximum speed of 60 miles per hour. During the last year 1,555,277 passengers were carried.

The Kansas City, Lawrence and Topeka Electric Railroad Company connects Kansas City, Rosedale, South Park, Shawnee and Zarah and at present there is in course of construction 52 miles of single track which will complete the company's connection between



Stretch of track along river—Kansas City-Western



INTERURBAN CENTERS AND CARS. Standard car of Kansas City-Western Railway

Kansas City and Topeka. Topeka is a city of 60,000 and Lawrence has a population of 16,000 and in addition the cities and towns along the route have a total population of 50,000.

The line between Kansas City and Zarah consists of 13 miles of track, of which total one mile is double tracked. The company generates its own power, maintaining a gas plant at Merriam, Kansas. The line is operated with a voltage of 550.

The car in use by the company measures 37 ft. over the vestibules, 38 ft. over the bumpers, 8 ft. 8 in. over the side sheathing and has a seating capacity of 40 and a total weight for car and trucks fully equipped of 40,000 lb. The cars are erected on composite under-



Kansas City-Independence car—Kansas City Railways



INTERURBAN CENTERS AND CARS. Sub-station at Blue River on the Kansas City-Independence line—Kansas City Railways

frames and are designed for double-end operation. They are run singly. For its normal operation the company uses a total of 5 cars, but it has 8 cars available for use. The company conducts a light express and freight business, carrying fruit, milk, etc. Despite the fact that there are about fifty stops in the length of the company's line, a maximum speed of twenty miles per hour is attained. Passenger statistics for the last year show a total of 425,000 passengers carried.

The Missouri and Kansas Interurban Railway connects Kansas City, Missouri; Overland Park, Rosedale, Lenexa and Olathe, Kansas. The operation of the company covers 22 miles of track and the company has available for use 7 motor and 5 other cars.

The Kansas City, Kaw Valley and Western Railway Company connects Kansas City, Edwardsville, Bonner Springs, Linnwood and Lawrence and an extension of the line from Lawrence to Topeka, which at present is under course of construction, will furnish another link between Kansas City and Topeka. The company has 40 miles of track in operation and 70 miles projected.



Mount Washington Station—Kansas City Railways

The Blue Valley Railway is a short line which is under construction and which will connect Kansas City, Leeds and Swope Park. At present 1¼ miles of track are in operation.



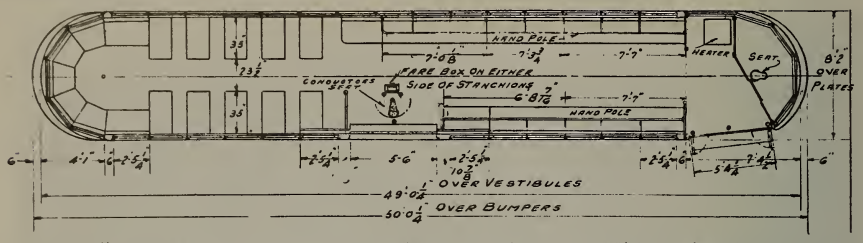
"Car Rider's Car" for Toledo

BRILL 51-E TRUCK

THE G. C. Kuhlman Car Company, of Cleveland, Ohio, has delivered to the Toledo Railways & Light Company, of Toledo, forty-five of the latest type Peter Witt front-entrance, center exit cars, very similar in design to the cars built for Cleveland and described in BRILL MAGAZINE for August, 1915, and March, 1916, and those built for Syracuse and Utica, which latter cars were described in BRILL MAGAZINE for October, 1916. The cars, of the type known as the "Car Rider's Car," combine the latest features of modern car design, both as pertains to efficiency and safety of operation and longevity of service. The order totals sixty cars, of which the remaining fifteen are rapidly nearing completion and will be delivered in the very near future. An interesting feature is the use of the new Brill Renitent Window Post.

The cars were purchased for operation on the lines of heaviest traffic. The system consists of seventeen lines, of which number three are belt lines, five are single-end lines which necessitate the use of double-end equipment and the remainder have either loops or wyes at either terminal. The city of Toledo has at present an official population of 250,000, which will give a more definite idea of the nature of the service.

At present the company has in service 275 cars, 144 of the pre-payment type, 27 of the open bench type and the remainder of the inside-fare-collection type. All the cars are equipped now with fare registers, and fare boxes have been placed on one line for trial. Very severe snow storms are encountered, but they never have crippled the operation completely. Toledo is not subject to the violent storms to which the other lake cities are subjected, due principally to the fact that it is situated in seven miles from the bay and is therefore sheltered. In the residence section the stops average but twelve to the mile, whereas in the business district this average is brought up to 18. The all-year-round average schedule speed on



"CAR-RIDER'S CAR" FOR TOLEDO. Height from rail to step, 13⅞ in.; height from step to floor, 11⅜ in.; height from platform to body floors, 5½ in.; longitudinal ramp in floor, 5½ in ; seating capacity 56; weight of car complete, 18 tons

the lines is 8.35 miles per hour. It is hoped that the addition of the new equipment will enable the company to eliminate the heavy rush-hour traffic in the business section and to relieve the congestion at several large factories which are located along the company's line and which close at the same time. The heaviest riding experienced by the company is from March to November, due to the increase of the forces employed at these various factories.

The type of the new cars differs very radically from that of the old equipment, in that the "Car Rider's Car" has nearly twice the carrying capacity of the old cars. The multiple unit control with which the cars are equipped makes their operation in trains possible, and it is expected that this train operation will move the rush-hour crowds more quickly, thereby facilitating traffic. Also, the company hopes to reduce accidents considerably. The train operation will reduce expenses, and the use of fare boxes will increase the net revenue. The "near-side stop" ordinance is in effect in Toledo, and since the public is more accustomed to standing near the crosswalk and then, after the car has stopped, walking to the rear to board it, thereby losing time, it is hoped that with the front entrance and center exit the time consumed in boarding will be reduced considerably.

Records established by cars of this type in actual operation in other cities have been most convincing. In one city it was found that fifty passengers entered and fifty left the car in less than fifty seconds. Still another record established in this same city was quite remarkable. One of the lines runs from the railway station through the business section, passing a number of the large hotels. Almost every passenger boarding these cars at the railway station was laden down with handbags and suitcases and many, being strangers in the city, stopped the conductor in his work long enough to answer requests for direction. On this line seventy passengers were taken aboard the car in fifty-seven seconds. The design of the car has created a great deal of favorable comment because of its efficiency and its time-saving features. At present it is in successful operation in Cleveland, Syracuse, Utica, Toledo, Rochester and Schenectady.

New Double-End, One-Man Cars for Stone & Webster Companies

FIFTEEN double-end, one-man cars measuring 17 ft. 9½ in. over the body corner posts, each car with a seating capacity of 30 passengers, recently were completed by the American Car Company and shipped as follows: ten cars to the Northern Texas Traction Company, of Fort Worth, Texas; four cars to the Puget Sound Traction Light and Power Company, of Bellingham, Washington, and one car to the Keokuk Electric Company, of Keokuk, Iowa. The design of the cars embodies the latest improvements of modern car design and will without doubt create a great deal of public favor in the three cities in which the cars are to be used. The popularity of the one-man method of operation is increasing rapidly, both with the public and the railway operators. The economy which the lightness in weight of these new cars will effect to the companies using them is one of their best features.

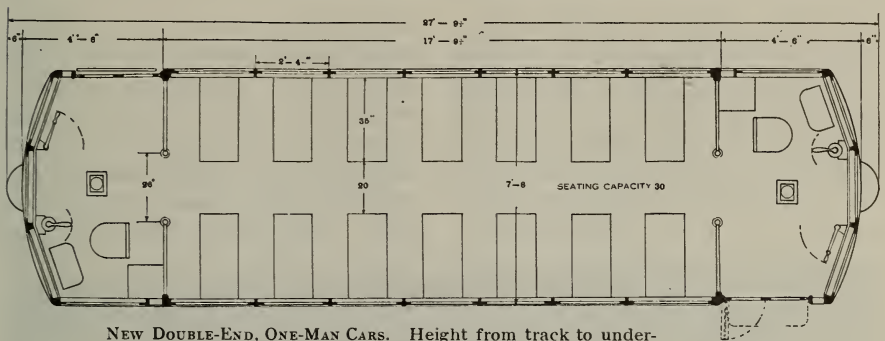
The Puget Sound cars were pur-



NEW DOUBLE-END, ONE-MAN CARS. The arrangement of the front platform is very good for one-man operation. The farebox is hung on a stanchion which is in the longitudinal centre of the car and is convenient both to the entering passenger and to the operator of the car. The operator's stool is placed well over to the left and is therefore out of the way of the passengers



NEW DOUBLE-END, ONE-MAN CARS. These cars, exact duplicates except as regards the lettering applied to each, are to be used in widely scattered localities, one shipment being to Texas, another to Iowa and the third to Washington. These cars embody the latest features of modern car design and are built particularly to meet the operating conditions which make one-man cars available for use

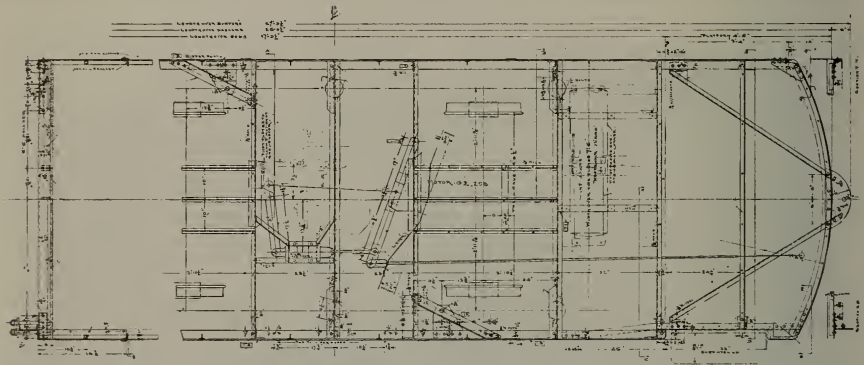


NEW DOUBLE-END, ONE-MAN CARS. Height from track to underside of side sills, $22\frac{5}{16}$ in.; height from underside of side sills over trolley boards, 8 ft. $1\frac{11}{16}$ in.; height from floor to center of headlining, 7 ft. 4 in.; weight of carbodies, 6,000 lb.; weight of truck less wheels and axles, 1,630 lb.

chased for use on the Bellingham Division of the Puget Sound Traction, Light and Power Company. Previous to the purchase of this new equipment this division, which operates 25 miles of track in a city of 25,000 population, had a total of 27 motor and 29 other cars. The new cars will be used to supplement this equipment. The Northern Texas Traction Company, operating from Fort Worth, Texas, a city of 74,000 population, to Dallas, is controlled by the Northern Texas Electric Company and also is under Stone and Webster management. These new one-man cars will of course be used for city service. Altogether, including its interurban lines, the company operates 126 miles of track with an equipment of 198 motor, 19 trail and 15 other cars. In addition it does the lighting and power business in Handley and Grand Prairie, both of which are served by the interurban lines of the company.

The Keokuk Electric Company, of Keokuk, Iowa, another Stone and Webster Company, operates an interurban line between Keokuk, Hamilton and Warsaw and in addition does the electric railway electric lighting, electric motor service and the gas business of Keokuk. The design of the new cars is expected to create much public favor for the company in Keokuk and undoubtedly its installation will mean an appreciable saving to the operating company. The company installed the one-man method two years ago, operating three cars on its Main Street line, using one conductor in the downtown district and operating under but one man in the residential district. Although the company is not burdened with the unfair jitney competition which is such a bugbear to many operators, it has been found that the new cars have effected a considerable saving in operating expense, which of course has increased the net income of the company. It has been found that with these small, light-weight cars the receipts have averaged sixteen cents per carmile. Operation under the one-man method has not

produced a single platform accident and the company's records show that accidents of other sorts have been reduced. This is due of course to the fact that under the one-man method of operation there is no danger of misinterpretation of signals and also because the responsibility is placed entirely upon the shoulders of one man, who therefore will exert extra precautions to guard against accidents. Also, it has been found that the absence of a conductor on the cars in no way increases step accidents and that the conductor's absence as a witness to guard against claims is by no means felt.



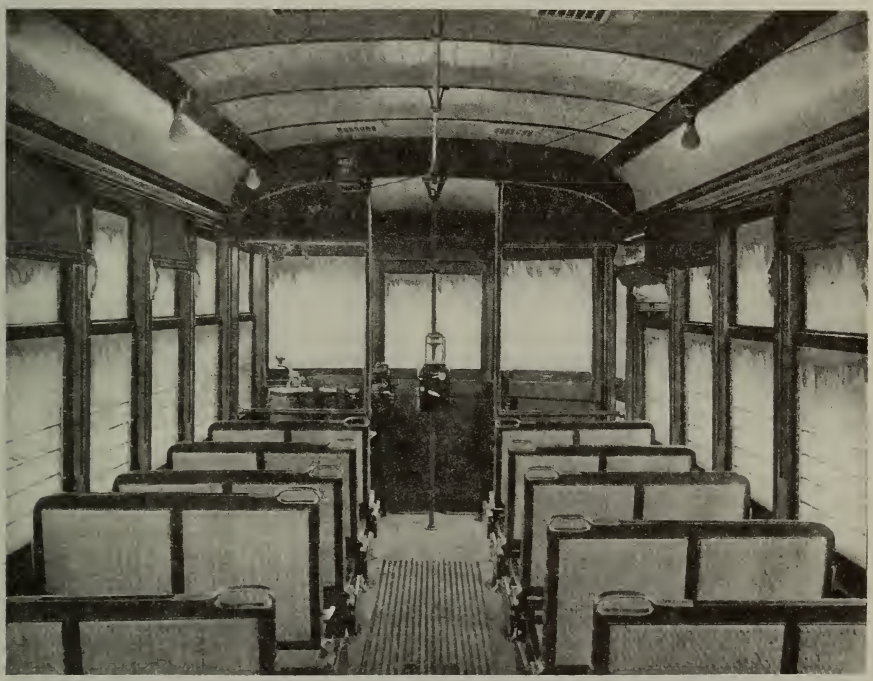
New Double-End, One-Man Cars. The side sills and bumpers are of angle. The platforms are braced with channels placed diagonally and with an angle crossing. The end sills and crossings also are of channel

The installation of the one-man cars in no way affected the actual operation of the company's lines, the schedule speed of 9.1 miles per hour having been maintained after the two-man cars were supplemented by the one-man equipment. Headway during both normal and rush hours was not changed.

The cars are built on underframes of steel construction. The side sills are of 3 by 3 in. angle extending from the bumper angle at one end to the end sill at the other end of the car. The bumpers are of 1½ by 1½ in. angle fastened to the side sill on the closed side of the car and to the outside platform knee on the other side. This outside platform knee, which in reality is a step knee, is of 6 in. 8 lb. channel and is fastened to the bumper angle by a gusset plate and riveted to the side sill at a point about thirty inches inside of the end sill. The platform is braced by two 3 in. 4 lb. channels extending from the bumper angle, at the drawbar pocket, to the side sill on one side and the platform knee on the door side, being fastened to each with gussets. In addition a 1½ by 1½ in. angle is used about half-way between the bumper angle and the end sill, which latter member is of 3 in. 4 lb. channel. The first crossing in from the end sill is of 4 in. 5.25 lb. channel, crossings of this dimension alternating with 3 in. 4 lb. channel through the length of the car between the end sills.

The arrangement of the front platform is remarkably good for efficient operation by one man. The controller is placed at the extreme left, the doors being on the right-hand side. Also, the air valve is well over to the left, thus bringing the motorman's stool beyond the center of the car and out of the path of entering passengers. The fare box is located in the exact center of the car, hung on a stanchion set in an appreciable distance from the vestibule front. Thus the fare box is readily at hand to the motorman and is easily accessible to the entering passenger.

Throughout the cars are built with a view to reducing weight but without sacrificing stamina. The lower sashes are arranged to raise, the upper sashes being built stationary. The cars are sheathed with sheet steel and the roof is of the arch type.



NEW DOUBLE-END, ONE-MAN CARS. The cars are finished neatly and simply on the inside. The roof boards and rafters are left exposed but are finished and painted neatly. The seats are caned in two panels. The windows have two sashes, the upper stationary and the lower arranged to raise

These cars have been appropriately named "Safety Cars" and the experience of the companies which have installed them has borne out this name. Accidents have been reduced appreciably following the installation of the one-man method of operation and the general performance of the car has been more than satisfactory.

Prepayment Equipment for Tazewell, Va.

BRILL 21-TRUCK

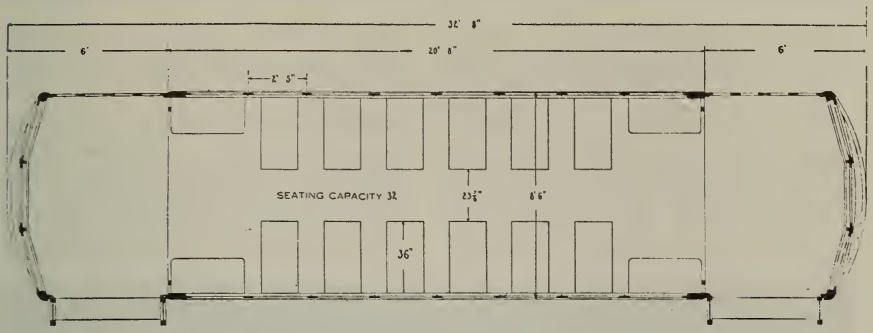
THE J. G. Brill Company recently has shipped to the Tazewell Street Railway Company, of Tazewell, Virginia, a 20 ft. closed prepayment car, mounted on a Brill 21-E Truck. This car will be used as a supplement to the old equipment of the company to aid in combating the competition which is being encountered from jitneys. The officials of the company report entire satisfaction with single-truck cars and also success with one-man operation during slack hours of traffic.

The car will be operated on a line running between Tazewell and North Tazewell, where the railroad station is located, and which is a separate corporation with a population of from 600 to 1,000. Tazewell, countyseat of the county by the same name, has a population of from 1,500 to 2,000. Service is maintained between Tazewell and North Tazewell on a half-hour schedule, cars leaving Tazewell on the even hour and half-hour and leaving North Tazewell on the quarter and three quarters.

Tazewell is located in the heart of a blue grass country, Tazewell County being noted as such. It is one of the wealthiest counties in the whole state and is famous for grazing fine beef or "export" cattle, so called because of the fact that until about five years ago all the cattle from Tazewell was shipped to the Liverpool market.



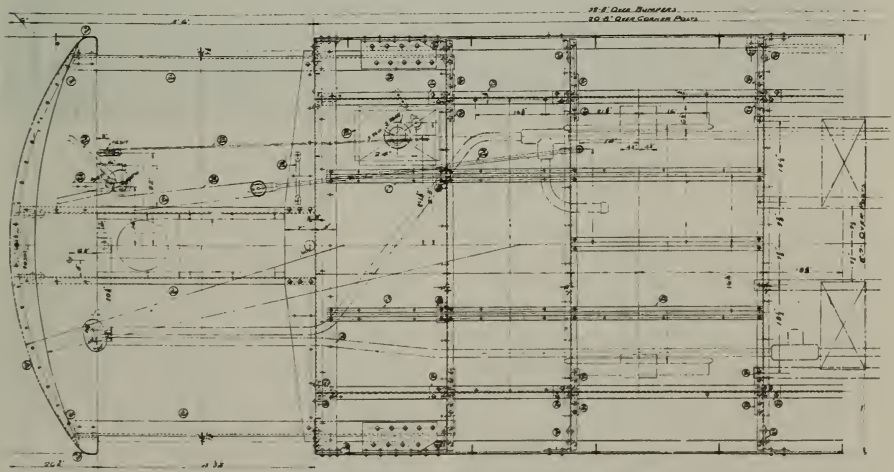
PREPAYMENT EQUIPMENT FOR TAZEWELL, VA. This car will be used to supplement the equipment of the company in combating jitney competition. The single-truck feature will effect a large economy in operation. The car will be operated under the old method of fare collection, although it is a typical prepayment car. This is because of the fact that the old equipment of the company is provided with bulkhead doors. However, the company can, of course, change over to pay-as-you-enter fare collection whenever it deems such a change advisable



PREPAYMENT EQUIPMENT FOR TAZEWELL, VA. Height from track to underside of side sills, 2 ft. 7¼ in.; height from underside of side sills over trolley boards, 8 ft. 11⅜ in.; height from floor to center of headlining, 7 ft. 10½ in.; track to step, 13¾ in.; step to platform, 13⅛ in.; platform to floor, 10⅜ in.; weight of carbody without electrical equipment, 14,290 lb.; weight of electrical equipment, 1,070 lb.; weight of truck, 5,140 lb.; weight of motors, 3,780 lb.; total weight, 24,280 lb.

The old equipment of the company has the same seating capacity as the new car, but the old cars were built with bulkhead doors and their platforms are smaller than those of the new car. The old method of fare collection—that by which the conductor passes up and down the aisle—has been used with the old equipment and, although the new car is a typical prepayment design, this old method will be continued. However, the company will have the advantage of being able to switch over to the pay-as-you-enter operation whenever the officials deem such a course advisable.

The single-truck feature of the new car's design also is especially adapted to the operation, because of the fact that there are several stiff curves and a heavy grade—seven percent. Thus it was decided



PREPAYMENT EQUIPMENT FOR TAZEWELL, VA. The underframes are of all-steel construction, the side sills of angle, end sills and crossings of channel, outside platform knees of angle and inside knees of channel

that the single-truck car would prove much more economical than a heavier, double-truck equipment.

The car is built on an underframe of steel in which the side sills are of 5 by 3½ in. angle, the end sills of 9 in. channel, the crossings of 4 in. channel, outside platform knees of angle and inside platform knees of 4 in. channel. In the body framing the corner posts are of 3-32 in. steel and the side posts are of 1½ by 2 in. tees extending from the side sill to the top rail. The car is equipped with the new Brill Renitent Window Post, a Brill invention which is creating a great deal of favorable comment in the railway field.

There are eight windows on each side of the car, the window heads straight and the windows equipped with double sashes, the lower sash arranged to raise vertically and the upper sash continuous the full length of the car. The step openings are enclosed with four-leaf folding doors in two sections.

The roof is of the Brill Plain Arch type, supported on steel U-shape rafters. Brill "Dedenda" Alarm Gongs and Brill "Dumpit" Sandboxes are provided. Also, Brill "Winner" seats, upholstered in rattan, were specified by the company.



PREPAYMENT EQUIPMENT FOR TAZEWELL, VA. The company carries a large number of school pupils to and from a public high school located at Tazewell. Hence, the folding doors and steps will reduce materially the dangers of boarding and alighting accidents

Semi-Convertible Cars for York, Pa.

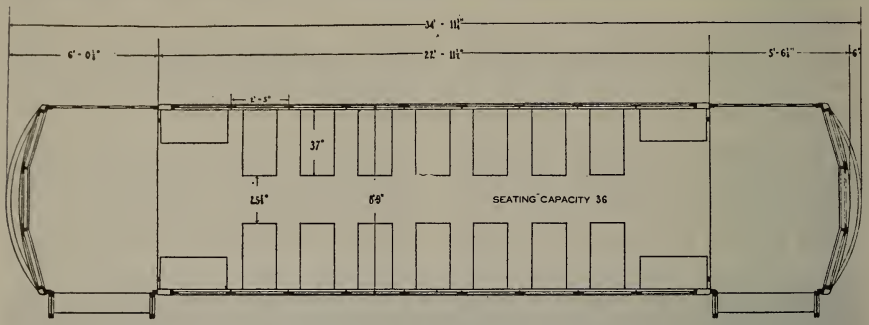
BRILL 21-E TRUCKS

SIX Semi-convertible prepayment cars, mounted on Brill 21-E Trucks, recently were completed for the York Railways Company, of York, Pa., by The J. G. Brill Company. These cars, which were purchased by the company for use on their Linden Avenue line, will replace 20-ft. cars of the old type. The new cars were ordered with a view to increasing seating capacity, abolishing step accidents and procuring a strong, medium-weight car equipped with the latest improvements of modern car design. The steps were given special attention. They are low and therefore they will very materially facilitate the movement of passengers to effect quick service. Except on streets which are not as yet paved, the passengers will enter the cars at the rear and pass out at the front. On unpaved streets exit may be made at either end.

The cars are built on underframes in which angles are used for the side sills, channels for the end sills, crossings and both outside and center platform knees and in which the wheel pieces are of angle. The side posts are of 2 by 2 by 1/4 to 5/16 in. tees, extending from the side sills to the top rail. The body corner posts are of 3/32 in. steel, extending from the sub "T" post entirely around the corner and up to the side of the bulkhead framing. The top rail is of angle, extending the full length of the car and riveted to the top of each side post. The letter board is of 3/32 in. steel riveted at the top to the top rail angle and the belt rail is of steel covered with pressed steel window capping. The vestibule corner and intermediate posts are of wood construction. The side sheathing of the car is of 3/32 in. steel, ex-



SEMI-CONVERTIBLE CARS FOR YORK, PA. These cars are of the popular Brill Semi-convertible prepayment type, mounted on Brill 21-E Trucks. The wheels are 26 inches in diameter, and the platforms consequently are brought low to the ground, thus facilitating the movement of passengers to effect quick service. The height from track to step is 12 inches

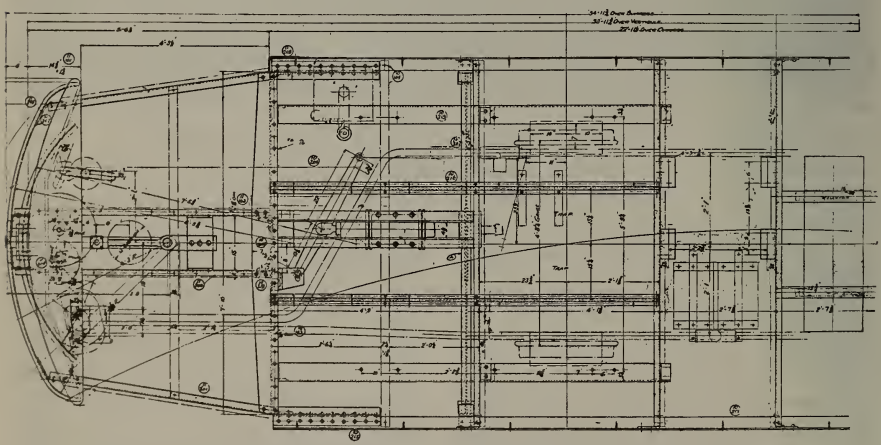


SEMI-CONVERTIBLE CARS FOR YORK, PA. Height from track to underside of side sills, 23⅛ in.; height from underside of side sills over trolley boards, 9 ft. 1¾ in.; height from floor to center of headlining, 7 ft. 9 in.; track to step, 12 in.; step to platform, 13 in.; weight of carbody, less electrical equipment, 13,000 lb.; weight of electrical equipment, 1,120 lb.; weight of airbrake equipment, 800 lb.; weight of trucks, 4,710 lb.; weight of motors, 3,520 lb.; total weight, 23,150 lb.

tending from the under side of the side sill angles to the belt rail.

The roof is of the Brill Plain Arch type, extending the full length of the car and supported on pressed steel, U-shaped rafters, located one at each side post. The canvas is stretched on ½ in. poplar boards, which first are given a heavy coat of paint.

There are nine windows on each side of the car, the window heads built straight. The windows are provided with upper and lower sash, the lower hinged to the upper and both arranged to raise into pockets in the roof. The sash stiles are of metal. This window system, known as the Brill Semi-Convertible Window, is most popular, having been installed on a great majority of orders. For some time it has been a standard of Brill construction. Its advantages are many and plainly to be seen. It makes the car adaptable



SEMI-CONVERTIBLE CARS FOR YORK, PA. The underframes are of steel, the side sills of angle, and the end sills, crossings and both outside and center platform knees of channel

for all-year-round service. Cars equipped with this Semi-convertible system are as popular with the public as the cross-bench open car, being cool, airy and comfortable in hot, sticky weather and having the added advantage of instantaneous protection from sudden weather changes, a protection superior to that furnished by the curtains of an open car.

The platforms are enclosed with stationary round-end vestibules, sheathed both outside and inside with sheet steel. Each vestibule has three windows, each window provided with double sash, the top sash stationary and the lower sash arranged to drop. On the entrance side of each platform there is a four-part folding door in two sections.

On the exit side of each platform there is a folding door in two sections, one section folding out against the body corner post and the other section folding against the end of the platform sheathing. The space between these folding doors and the vestibule corner posts is sheathed up to the height of the body belt rails and in the upper portion of this sheathing there is a window with double sash, the top sash stationary and the lower sash arranged to drop.



SEMI-CONVERTIBLE CARS FOR YORK, PA. The new cars will replace 20-ft. cars of the old type. They were ordered with a view to increasing the seating capacity and abolishing step accidents, as well as to procure a strong, medium-weight car



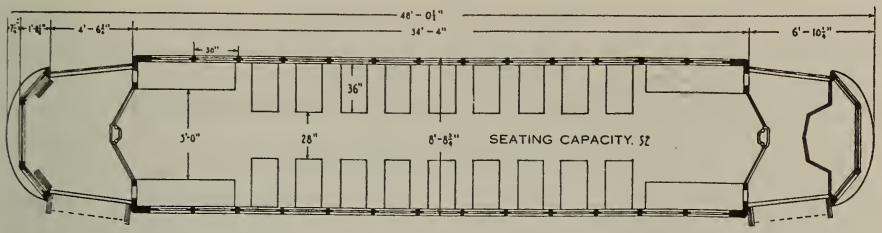
New Cars for Boston Elevated Lines

BRILL RENITENT WINDOW POSTS

THE Boston Elevated Railway has received from the Wason Manufacturing Company, of Springfield, Mass., ten typical double-end closed surface cars, which are illustrated herewith. The cars are sheathed in steel and have the interesting feature of being equipped with the new Brill Renitent Post, a device which, in spite of its comparatively recent perfection, has attained a high degree of popularity.

A striking feature of the car is the manner in which the co-operation of the public in time-saving and in safety has been solicited. As the car approaches, a sign at the front of the car proclaims the fact that it is a prepayment car and, as the car comes to a stop, directly in front of the eyes of the waiting passengers, on the side of the car, is a sign which requests that they have their exact fares ready. Also, at both front and rear, on the side of the car, near the doors, there is a sign which reads "Avoid Danger, Don't Enter or Leave Car After Bell Rings."

In general the design of the car is that of the typical double-end prepayment type of car. The vestibules are enclosed with four-leaf folding doors, two leaves folding against the vestibule corner post and the other two folding against the body corner post. The rear door is divided by a pipe stanchion extending from the platform floor to the top of the vestibule. The half of the door next the body is used by passengers leaving the car, the step being plainly labeled "out" and the other half of the door is used by entering passengers. Of course, the door on the front platform also serves as an exit. This arrangement has been found a very satisfactory one, the entering passengers being given the major part of the rear platform by virtue of using the outside of the two



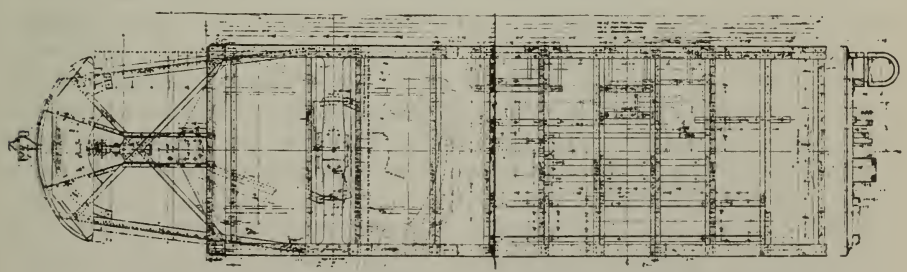
NEW CARS FOR BOSTON ELEVATED. Height from track to underside of side sills, 3 ft. 2⅝ in.; height from track to step, 15 in.; from step to platform, 15 in.; from platform to floor of car, 10 in.; weight of carbody, 22,550 lb.

routes, this of course providing space for a few passengers whose fares have not been collected to stand and making it possible to start the car before all fares have been taken. Entering, passengers may pass on into the car and seek accommodation on the transverse seats or the longitudinal seats near the front or, if they are going but a short distance and if the car is crowded, the tendency is for them to stand in the space between the longitudinal seats at the rear, using the rear door in leaving the car.

The car, thirteen windows long, is planned so that it has eighteen transverse seats, taking care of thirty-six passengers. The very number of transverse seats would indicate the efficiency of the arrangement described, it being likely that but a very few passengers would remain at the rear of the car instead of seeking one of the comfortable cross seats. Thus the major part of the passenger load is drawn toward the front of the car and the performance of the car in loading and unloading has been noted as very good.

The roof of the car is of the monitor deck type, the platform hoods being set down from the level of the roof so as to provide for a destination sign at each end of the car. Also, at the center of the car there is another destination sign.

The cars are built on underframes in which the side sills are of 6 by 3½ in. angle, the end sills of 10 in. channel, the crossings of sheet steel pressed Z-shape, the bolsters of cast steel, the outside



NEW CARS FOR BOSTON ELEVATED. The side sills are of angle, end sills of channel, crossings of Z-shaped steel, bolsters of cast steel and platform knees of angle and channel

platform knees of 7 by 3½ in. angle and the center platform knees of 6 in. channel. The platforms are further braced by 2½ by 2½ by ⅜ in. angles, extending diagonally from the crown pieces to the outside platform knees, to which they are fastened at a point just back of the end sills. The bumpers are of 6 in. channel.

Although the cars are mounted on 33 in. wheels the platforms are brought down so that access to the platform is given by two easy steps of fifteen inches. The outside platform knees are fastened to the side sills and are bent down under the end sills, which are Z-shaped. This feature of carrying the platform close to the ground—a feature which finds instant and unmistakable favor with the public—has been carried further in other cars recently built, wheels of smaller diameter being used and the platform swung close enough to the ground to make it possible for the passengers to step direct from the street to the platform. A notable example of this may be found in the type of car built for the Wilmington & Philadelphia Traction Company, in which cars the height from the track to the floor of the platform was but fifteen inches. This car was described in BRILL MAGAZINE for May, 1916.



NEW CARS FOR BOSTON ELEVATED. This car is a typical double-end prepayment city car similar to others which have been in successful operation in a large number of places. The car is sheathed in steel. Brill Renitent Window Posts form an important part of the car's design

Funeral Cars for International Railway of Buffalo, N.Y.

SEMI-CONVERTIBLE TYPE

TO replace equipment which was lost by the company through a fire, The J. G. Brill Company recently shipped to the International Railway Company, of Buffalo, New York, two semi-convertible funeral cars, very similar in design to the type of funeral car built for the Philadelphia Rapid Transit Company and described in BRILL MAGAZINE for September, 1912. This latter car has been in constant use since the day it was delivered to the Philadelphia company and the service it has rendered has been described by the officials as more than satisfactory.



FUNERAL CARS FOR BUFFALO. This car is very similar in design to a funeral car built for the Philadelphia Rapid Transit Company in 1912 and described in BRILL MAGAZINE for September of that year. It will replace equipment lost through fire

The car is divided into two compartments, the rear half of the car seating 40 persons, for the most part on transverse seats, and the other compartment seating six persons (the usual number of pall bearers is six) on a longitudinal seat across the aisle from the compartment which holds the casket. As may be seen from the photograph of the exterior of the car, the casket is placed in its compartment from the outside, the outside panel being opened and closed by a mechanism somewhat similar to that used in upper berths of sleeping cars.

The car is built with a roof of the Brill Plain Arch type, supported on concealed rafters. The window sashes are built according to the Brill semi-convertible window system. In this system the lower sash is hinged to the upper sash and both sashes are raised together into the roof of the car,

resting in roof pockets built between the ceiling and the rafters. The system has proved more than popular and deservedly so. The lower sashes being raised into the roof, the necessity for sash pockets —which decrease the space for seats—is done away with. Thus the seats are placed further in and either a wide aisle or longer seats (or both) is possible. The absence of sash pockets in the car wall means there is no chance of trash being wedged in the pockets, breaking the glass when the sash is raised.

Over the casket compartment, in the side of the car, there is a long plate-glass window. The panel which closes the casket from view is drawn down to the level of the floor of the compartment by two handles on the outside and is closed by means of a cable and strong spring pulley. Rollers are fitted to the inside of this panel so as to permit the casket to be slid into its compartment with but little effort on the part of the pallbearers. The casket compartment also serves as a receptacle for flowers, a railing being built around the top of it to permit the banking of floral tokens. Thus the casket is carried out of sight but the floral gifts are plainly visible to all occupants of the car.



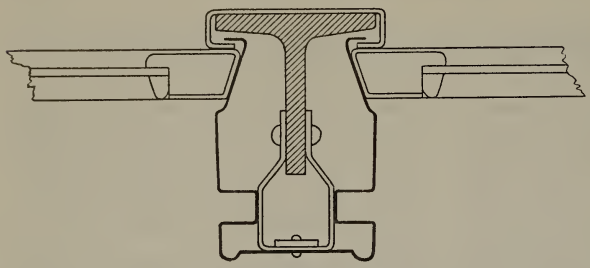
Funeral Cars for Buffalo. The casket compartment shown in this photograph is accessible from the outside of the car, the outside panel opening out until it is on the level of the floor of the compartment. This panel is fitted with rollers, upon which the casket is slid easily into place. Flowers are banked on top of the casket compartment, the railing provided for that purpose being shown

The Brill Renitent Post for Car Windows

THE practicability of steel car framing and its many advantages over wooden construction never for a moment have been questioned by anyone interested in or connected with the electric railway field and the tremendous popularity of this method of construction, as evinced by the fact that it has been specified for a very large majority of recent orders, therefore is but tangible proof of something already recognized as true. Along with the popularity of steel-framed upper structures has come the realization that the ordinary window post construction—consisting of T-posts to which grooved wooden runways for sashes and curtains and the wooden pilaster are attached—is not thoroughly efficient. This is due to the fact that wood has a tendency to swell when subjected to dampness and moisture. Consequently the demand of the field for a post which would not be affected by dampness—an entirely reasonable demand—soon became strong and immediately The Brill Company turned its attention to the subject of an all-metal post. The result has been the Brill Renitent Post, one of the greatest achievements in modern car construction—a post that is water-tight, rattle-proof, safe against sash dropping and in which the sash is easily removed from its runways without tools.



Brill Renitent Post. This post gives the field a window sash that is water-tight, rattle-proof, safe against dropping and in which the sash easily may be removed from its runways without the use of tools. The Renitent Post makes the sashes interchangeable from window to window and from car to car, where the specifications are the same



Brill Renitent Post. The spring-brass casing is outlined in a heavy line. The clips and the stirrups with which the casing is attached are shown

The post is named from its feature of "offering elastic resistance to pressure." It consists of a casing of spring brass which is attached to the T-post by means of clips. Any one of the advantages of the window would be great enough to warrant its use, and, therefore, these advantages being so many, the popularity of the post is readily understood. In the first place, the fact that the window sashes may be removed without tools is of tremendous importance. Ordinarily, removing a sash from its casing involves careful handling of tools by a mechanic and the loss of some little time. The Brill Renitent Post may be taken from its casing simply by pulling it out. However, the casual pressure exerted on a sash by a passenger raising or lowering it cannot remove the sash from its casing. Also, the sash cannot be disturbed by any wind pressure, no matter how great. Another very great advantage of the Renitent Post is that the elastic pressure exerted on the sash stiles by the spring brass runways absolutely prevents rattling, and because the sash will drop gradually should the catches become unfastened, gives the passenger safety against injury to the hand or arm that may be resting on the window sill. This same feature of the check on the dropping of the sash gives still another advantage—it prevents sashes from being racked and the glass broken by careless handling. Still another very great advantage is that the spring-brass casting gives a uniformity which does away absolutely with the fitting of sashes individually into the runways, as must be done with sashes that slide in wooden runways. Thus the windows are interchangeable all over the car and from one car to another, where the window specifications are the same. Yet another advantage is that the post casing is readily removable from the T-post. Thus, should it ever be necessary to inspect the T-post or to make repairs in case of collision the post is easy of access.

The Renitent Post, in addition to the many advantages which have been discussed, presents a better appearance than can be obtained with wood. It makes a lighter looking post than does the wooden post and it is neater.

The post may be applied to any type of city or interurban car with the exception of the Brill Semi-convertible type, being also adaptable to the twin-post window system. It is made in a range of sizes covering every width of post.

SUGGESTIVE SUBJECTS

Note.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

BRILL RAILWAY PUBLICITY SERVICE

IS there something in the attitude of the public of your city toward your operation which seems unfavorable—or, what is almost as bad, indifferent? What is the usual stand taken by the public in connection with matters directly affecting the interests of your line? Are you in the position of many other managers who have come to a realization that the public's idea of their operating methods is very sadly awarp? If so, you can make use of our services, as have many other railway managers faced with a problem closely akin to that now confronting you. We have had in successful operation for some time a free service which we style the Brill Railway Publicity Service. Through this service of ours we are coming in constant touch with the publicity work of various railways and through this contact, as well as through the years of direct correspondence in connection with Brill Magazine articles, the Brill publicity staff has accumulated a wealth of information and statistics. All of this information and these statistics are available for those who make use of our service and in a number of cases valuable hints have been extracted from the experiences of other roads. The service is absolutely free to everyone connected with the electric railway field; there are no strings attached to it; there are no obligations assumed by anyone making use of it. The object of the service is to supply railway managers with material in the way of publicity campaigns, suggestions and copy that may prove valuable. Our idea is that anything that benefits the electric railway business in general will benefit the car-building business and thus is accounted for the fact that the service is offered without charge or obligation of any sort.

THE CONDUCTOR AND TYPES OF HUMANS

NO ONE fully can enjoy life who is not chock full of the desire to do his greatest service to those who come his way. To whom more than to the conductor is offered this possibility? Think of his daily contact with humanity. Hundreds come before him—new faces and old, the aged mother whose days of service near their end, toddling babes, boisterous youths, and giggling girls. The conductor could not be better placed to serve so many in "little acts of kindness." This person may be cheered by a pleasant greeting; that one by enjoying his mirth; another may need a helping hand—and all require the conductor's being master of himself, lord of politeness, monarch of the car and at the same time the willing servant of his passengers.

A THOUSAND DOLLARS WELL SPENT

THE Columbus Railway, Power & Light Company on December 31 closed a most successful safety campaign, waged against car-and-vehicle collisions. This campaign, which cost the company the sum of $1000 in prize money, was most productive of good results, as is shown by the fact that, although the number of horse-drawn vehicles, automobiles and bicycles in use in the City of Columbus has increased eighty-three per cent during the last two years, the company has had an increase in collisions of only thirty-five per cent. The interest which the men of the company have taken in the contest has been most marked, as has also their gratitude for the remunerative appreciation on the part of the company. The contest covered a period of six months, from July 1 to December 31. The accidents

occurring during this period were figured on a mileage basis, and each carhouse worked against its record for the same period of 1915 instead of competing directly with the other carhouses, this because of the fact that the operating conditions on the various lines differ greatly and that a contest wherein records of the carhouses were compared with each other therefore would not be fair. The company included in its reckoning of the contest all collisions between cars and vehicles regardless of where the responsibility for the accident rested. Still another condition of the contest—and a very wise one—was that all unreported accidents should count the same as five reported accidents. The enthusiasm the employes of the company have exhibited in the contest has been very gratifying, and, in short, the company regards the $1000 spent in the contest a very good investment. In a safety bulletin announcing the conditions of the contest the men were told that each platform employe of the carhouse establishing the best record for the stipulated period would receive $5, and the employes of the carhouse setting the second best record would be given $2.50. Provision was made for the platform men whose term of service did not cover the entire six months in an arrangement whereby such men would share in proportion to their time of service. In this bulletin six very excellent suggestions were set forth for the guidance of the candidates for the prize money. They follow:

1. All practices tending to divert in any way the motorman's attention from his duties should be discontinued.

2. Become thoroughly familiar with the "danger points" on the lines. These are the places where careful watch must be kept for the automobile driver who dashes across the car tracks without reducing speed. Have control of your car.

3. Keep a weather eye on all machines being driven alongside of the car. They may suddenly turn onto the tracks in front of the car in attempting to pass a more slowly moving vehicle, or one standing at the curb.

4. *Help the new man.* You have had more experience than he. You know better what to do in emergencies—exactly what move to make first. Let him have the full benefit of your seasoned knowledge—for your mutual advantage.

5. Conductors, when assuming the duties of motormen, as is frequently necessary, bear in mind the above points carefully. Lend your aid in all cases of emergency.

6. Know that the safety appliances on your car are in proper operating condition.

WATCH YOUR SPEED

WHEN the officials of a railway company make the schedules they time the run to the full extent of speed the law of safety allows. They are economical, but careful; desirous of speed, but thoughtful of lives. It is well to bear this in mind, especially at this season of the year, with its prospective snows and general bad weather looming up. It is not unusual for cars to be blocked five, ten, even fifteen minutes. This is not very long, but it means much to trolley men. Motormen must be careful. When blocked for a very long time don't try to reach the end of your run at the time on the schedule; don't try to cut too deeply into the amount of time allowed you by the schedule for actual running. Otherwise a wagon darting from some side street, a pedestrian rushing for an opposite-bound car, or a child toddling unconsciously across the tracks may be at the wrong place when your car arrives. Be safe, always.

CHANGES OF ADDRESS

THOSE who receive "Brill Magazine" are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.

BRILL DEDENDA GONG



NO chattering sound, either by carelessness or design—that's the secret of the popularity of this gong. Besides, the pedal may be locked down when not in use, so that passengers cannot ring the gong on the dead end of the car.

THE J. G. BRILL COMPANY

Main Office

PHILADELPHIA, U. S. A.

Cable Address: "Brill," Philadelphia

London Office

110 CANNON ST., E. C.

Cable Address: "Axles," London

AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
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Agencies

AUSTRALASIA—Noyes Brothers, Melbourne, Sidney, Dunedin, Brisbane, Perth

BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

THE BRILL 21-E TRUCK



THE popularity of this truck should speak with convincing eloquence of the efficiency of the truck's design for the work it has to do. For years it has remained the standard for single-truck cars and the demand for it is constantly on the increase. Its use for the popular light-weight, economical, single-truck cars which recently have been built in such large numbers is predominant.

BRILL RADIAL DRAWBAR



THIS drawbar is aptly described as self-contained, there being no loose parts to repair or replace. The single spring is arranged on the bar so that it performs the functions of both draw and recoil. For cars of less than thirty feet over the body the smaller bar (see above) is used, and for larger cars, the larger, channel-iron drawbar is sold.

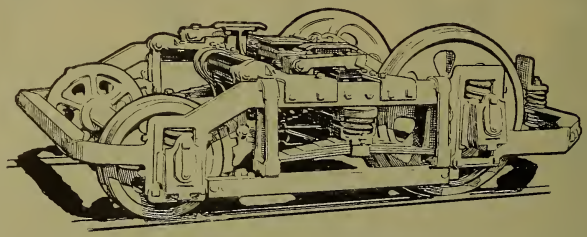
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THE BRILL 39-E TRUCK



THE BRILL 39-E has remained the standard single-motor truck for a long time, its lightness in weight, its wide truck centers (which permit a considerable reduction in body weight), its "Half-ball" Brake Hangers, its Graduated Spring System and its solid-forged sideframes all contributing to the success of the truck and being in combination responsible for the undoubted favor it has found in the field. The Graduated Spring System ranks well up toward the head of this list of advantages. This system in combination with the Brill Bolster Guide provides a smoothness which is most welcome to the riding public, the light-load springs giving the car good spring action no matter how lightly loaded.

BRILL SEATS AND SUPPLIES



Brill "Winner" Seat

"Half-ball" Brake Hangers, Drawbars, Grab Handles, Ratchet Brake Handles

Pinion Pullers

Brill Curtains of any material, for open or closed cars

Platform Steps and Step Hangers for all types

Platform Gates for open-platform cars

Angle-iron Bumpers & Bumper Shields for any type car

Round-corner Seat-end Panels and Running-board Hangers for open cars

"Dedenda" Alarm Gongs & "Retriever" Signal Bells—best on the market

Wide-wing Journal Boxes for 21-E Trucks

Graduated Spring Device for 27-G Trucks

Swing-link Journal Boxes for 21-E Trucks

Send for Brill Order Guides for Car and Truck Parts



C. M. Wilson.

Vice-President and General Manager, Wilmington & Philadelphia Traction Company

When Jupiter launched the thunderbolt which Benjamin Franklin so deftly caught in his kite neither the great mythological god nor the learned philosopher even dreamed of the tremendous commercial possibilities revealed by that historical flash of lightning and for a century afterward the world was content to plod along in its accustomed way with its tallow dips and oil lamps, its mounted messengers and horse-drawn vehicles.

And then came the great electrical development which, during the last thirty years, has so completely revolutionized the country's industries and more than any other single factor has resulted in the United States taking first place among the countries of the world in the magnitude and diversity of its industries. Approximately 1,000,000 people are now directly employed by our electric railways, electric power stations and telephones and telegraphs and the gross value of their products and income amounts to $1,201,000,000 annually.

Despite the enormous advances made and the results accomplished in electric railway, light and power developments, I am firmly of the belief that we are only fairly started and that there is no industry with a brighter future than the electric industry. There are countless factories still operating steam-driven machinery. There are millions of houses yet unwired. The trunk line railway systems are still largely steam operated and the inventive genius of mankind has never been more active. I confess to being an optimist in regard to the electrical industry and have an abiding faith in its future.

—T. W. Wilson.

BRILL MAGAZINE

VOL. 11—NO. 2 Copyright, 1917, by The J. G. Brill Company, Philadelphia, U. S. A. FEBRUARY 15, 1917

THOMAS W. WILSON

THOMAS W. WILSON, Vice-President and General Manager of the Wilmington & Philadelphia Traction Co., is a native of New York, having been born in that State in 1876. He was educated in the public schools and Lehigh University and was graduated from the latter with a degree of Civil Engineer. After graduation he entered the Engineering Department of the Pennsylvania Steel Company and remained there several years, leaving to become engineer of the Charleston City Railway Company, Charleston, S. C. At the outbreak of the Spanish-American War he enlisted in the Eighth Pennsylvania Volunteer Infantry and served as Topographical Engineer of the Second Army Corps until mustered out at the end of the war. In 1899 he became associated with the International Railway Company of Buffalo, New York, as Engineer of Maintenance of Way and remained there for fourteen years as Engineer of Way, Chief Engineer, and for the last seven years as General Manager. He then became associated with the National Properties Company. He is a director of the National Properties Company and of the American Railways Company and their various subsidiary companies and is Vice-President and General Manager and a director of the Wilmington & Philadelphia Traction Company, Southern Pennsylvania Traction Company, Peoples' Railway Company, Wilmington; New Castle & Delaware City Railway Company, Wilmington Light & Power Company, New Castle County Electric Company, Chester County Light & Power Company and Wilmington Automatic Telephone Company. He is a member of the American Society of Civil Engineers, The American Electric Railway Association, The Elks, Wilmington Chamber of Commerce, Wilmington Rotary Club, Wilmington Club, Wilmington City Club, Wilmington Country Club, University Club of Buffalo and Buffalo Club of Buffalo.

Interurban Centers and Interurban Cars

COLUMBUS

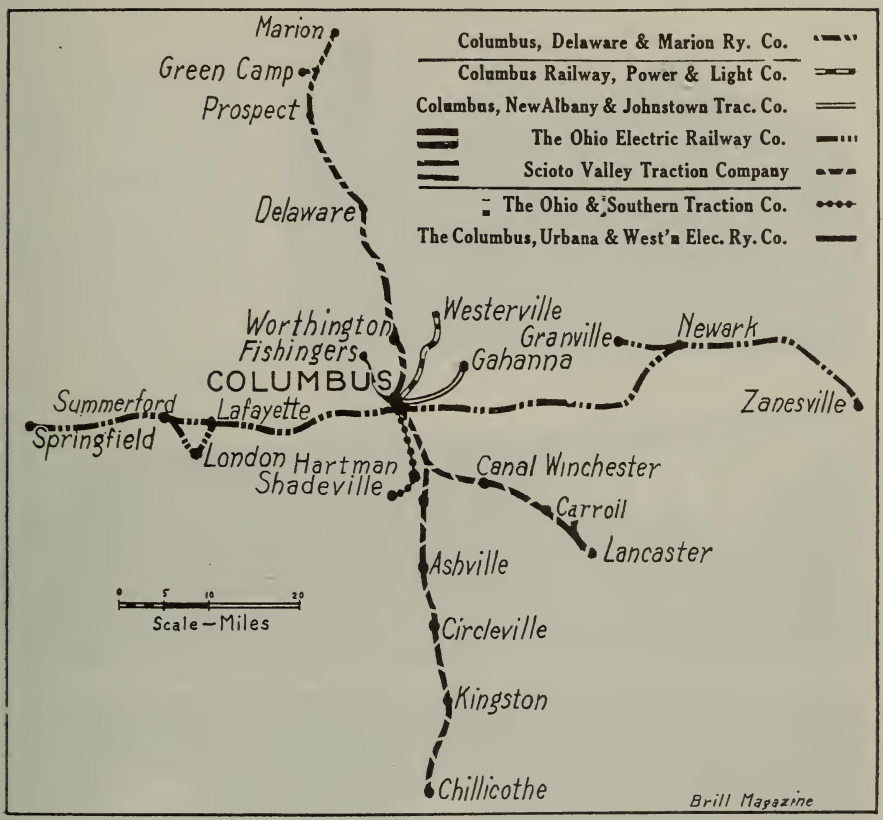


HALFWAY between Cincinnati and Cleveland is located Columbus, capital city of the State of Ohio since 1812. Not only is the city midway between Cleveland and Cincinnati, but it is in what is almost exactly the geographical center of the State and what is practically the center of population of the whole United States. The present estimated population of the city is about 250,000. Its census returns in 1910 showed a total of 181,500; in 1900, 125,500, and in 1890, 88,000. The city is at the confluence of the Scioto and Olentangy Rivers and is a port of entry.

Columbus is an important railway center, being served by the Cleveland, Cincinnati, Chicago and St. Louis; the Pittsburgh, Cincinnati, Chicago and St. Louis (Pennsylvania system); the Baltimore and Ohio; the Ohio Central; the Norfolk and Western; the Hocking Valley and the Cleveland, Akron and Columbus (Pennsylvania system). The service furnished by these steam roads is, of course, in addition to that furnished the city by its interurban system.

The city has an area of about 22 square miles, the principal portion being along the east side of the Scioto in the midst of an extensive plain. Of its total area the city has 240 acres devoted to public parks—these, of course, in addition to the beautiful scenery along the Olentangy and the Scioto Rivers, which flow through the city. Besides the public parks there are other parks which total 100 acres in area. Important buildings located at Columbus include the State Penitentiary, which is one of the oldest in the country, being famous for having been the prison in which Morgan and his raiders were imprisoned during the Civil War. The Columbus State Hospital, with grounds totalling 325 acres, and a modern water system, with an immense storage dam on the Scioto River, are among other important public institutions worthy of mention. The city is laid out after the plan of the national capital, Washington. The principal business street, High Street, is 100 feet wide. This street is shown in the illustration appearing on the front cover page of this issue of BRILL MAGAZINE. One other notable street is Broad Street, which is 120 feet wide. This street is a fine residential street with four rows of trees, a roadway in the center for heavy traffic and a driveway on either side for carriages, etc.

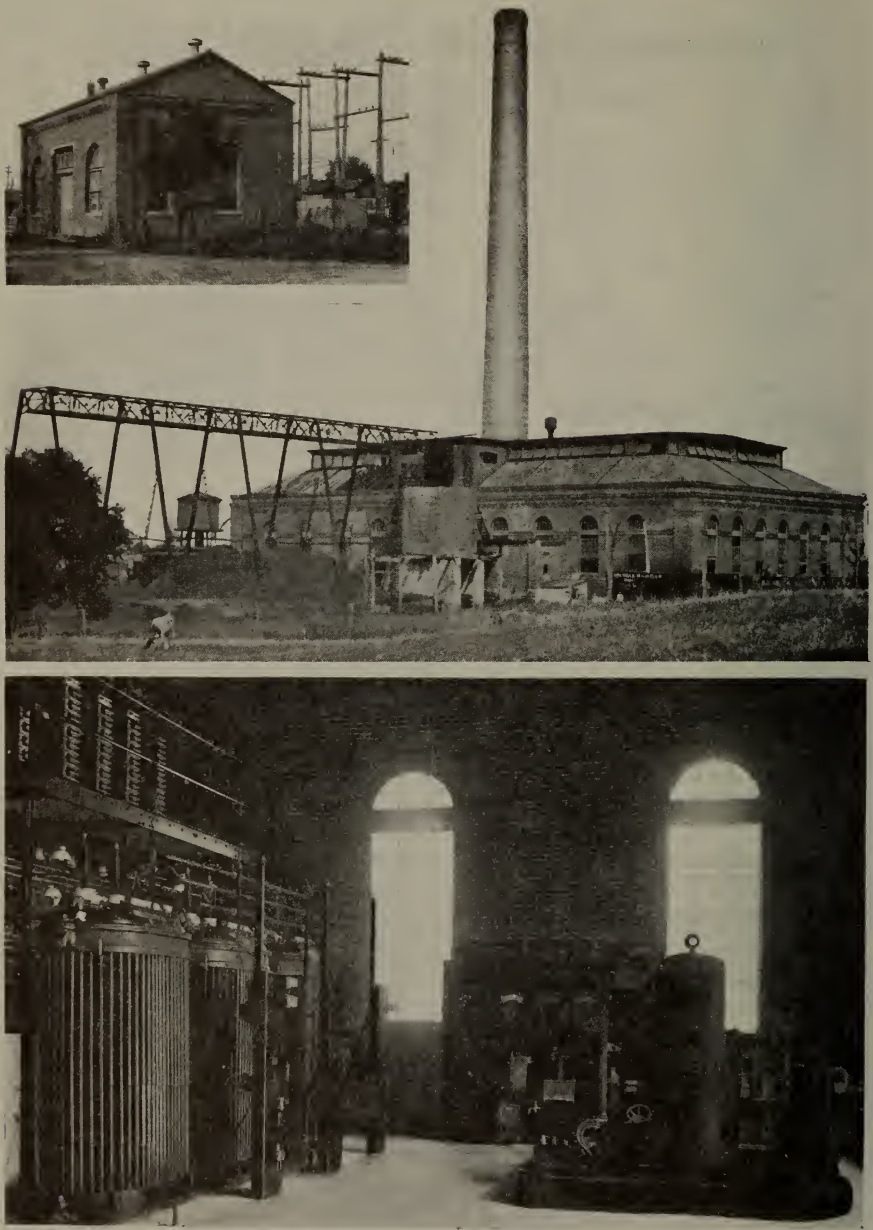
The city is located near the Ohio



coal and iron fields and it has an extensive trade in coal. However, its largest industrial interests are manufactures, among the most important of which are foundry and machine-shop products, boots and shoes, patent medicines and compounds and iron and steel. The city manufactures about one-sixtieth of the total product of boots and shoes made in the United States. In this manufacture of boots and shoes it vies with Cincinnati in leading the cities of the State. The city also is a large market for imported horses. In addition to all of these industries, there are many quarries located adjacent to the city.

The location of the city in the geographical center of its own State and at the center of population of the United States has made it extremely popular as a convention city and those interested in the growth and welfare of Columbus for some time have been booming their city along this line. In fact, the "staging" of conventions has become to be a considerable business with the city.

Columbus has a great advantage



INTERURBAN CENTERS AND INTERURBAN CARS. Powerhouse of Scioto Valley Traction Company and [insert] typical sub-station

in the possession of an abundant supply of natural gas. This gas is sold at a very low rate, as compared to that charged in some other cities, and is an important feature of the growth of the city's industries.



INTERURBAN CENTERS AND INTERURBAN CARS. Station at Kingston

Columbus is the center of a fertile and wealthy farming territory. The city is the county seat of Franklin County and fully ninety per cent. of the territory of this county is in farms. These farms alone produce annual crops totalling about $5,000,000 in value. Flour milling is one of the city's important industries, due to the proximity of the city to the soft winter wheat. The city is likewise the center of a great dairy and poultry district, which has attracted numerous creameries and dairy product concerns and which is growing steadily. Necessarily Columbus' good interurban transportation facilities, through its interurbans reaching out in all directions from the city into this fertile territory, mean a great deal to the city in the booming of this territory and the consequent influence on the city's prosperity. Farmers are attracted to Columbus because of its good transportation facilities



INTERURBAN CENTERS AND INTERURBAN CARS. Station on lines of Scioto Valley Traction Company. The company operates two divisions, as shown on map



INTERURBAN CENTERS AND INTERURBAN CARS. Steel bridge, typical of construction on company's lines

for the export of their products and also because of the city's five municipal markets, where their products find ready sale.

The interurban service of Columbus is furnished by seven interurban companies. These are the Ohio Electric Railway Company, the Scioto Valley Traction Company, the Columbus, Delaware and Marion Railway Company, the Columbus, New Albany and Johnstown Traction Company, the Columbus, Urbana and Western Railway Company, the Columbus Railway, Power and Light Company and the Ohio and Southern Traction Company. The Columbus Railway, Power and Light Company operates a fourteen-mile line to Westerville, which line, however, is regarded as more of a suburban operation.

The Ohio Electric Railway is one of the most important of these interurban operations, especially in view of the numerous connections with other points which are made possible through its entry into Columbus. Its total of about 650 miles of interlocking lines speaks eloquently for the truth of this statement. The company operates from Zanesville on the east of Columbus through Newark to Columbus and thence through Springfield to Dayton. From Dayton a line extends to Union City, where connection is made with the Indiana Union Traction Company for Muncie, Anderson and Indianapolis. Also from Dayton there is a line extending to Richmond and at this latter point connection is made with the Terre Haute, Indianapolis and Eastern Traction Company for Indianapolis. The Ohio Electric also extends from Springfield north through Urbana and Bellefontaine to Lima, and from Lima it extends to Defiance. Other lines connect Dayton



Typical span on line of company: roadway passing beneath the track



INTERURBAN CENTERS AND INTERURBAN CARS. Type of suburban car in use on lines of Columbus Railway, Power & Light Company. The cars were built on steel underframes and are mounted on Brill 27-M.C.B. Trucks

with Toledo, Cincinnati and Ft. Wayne, Indiana. Thus, the wide scope of the company's operation and its effect on the interurban situation in Columbus readily is apparent.

The Scioto Valley Traction Company operates 78 miles of track, the majority of which is laid single, connecting Columbus and Lancaster and Columbus and Chillicothe and intermediate points. Three cities of sizable populations on the company's lines are Chillicothe, 14,500; Lancaster, 13,000; and Circleville, 7,000. In addition to these there are six other towns which have populations of less than 1,000.

The company generates its own power at a station located about nine miles from Columbus. The power plant is operated by steam and eventually will have a total capacity of 10,000 kw. The transmission voltage is 27,000 and the line-operating voltage 650.

The standard car in use by the company measures 58 ft. 4 in. over the vestibules, 60 ft. over the bumpers, 8 ft. 4 in. over the side



INTERURBAN CENTERS AND INTERURBAN CARS. Double-deck car in use by Columbus Railway, Power & Light Company. The illustration on the front cover page of this issue shows this car as it appears in actual operation on Columbus' chief business street. The type, center-entrance and stepless, is an interesting one

sheathing, and has a seating capacity of 70 persons. The car with its Brill 27-M. C. B. trucks weighs 84,000 pounds. The cars are equipped with multiple-unit control for train operation and are designed to collect the current through a third rail. The maximum speed made on the lines is sixty miles per hour and the stops average one to every two miles. The track is laid on private right-of-way, making this high-speed service possible. The company has a total of seventeen motor cars.

The Ohio and Southern Traction Company operates a short line of about seven miles from Columbus to Hartman Stock Farm, as indicated on the accompanying map. The company has a total of fourteen cars. Its power is purchased from the Columbus Railway, Power and Light Company.

The Columbus, New Albany and Johnstown Traction Company connects Columbus with East Columbus and Gahanna, operating nine miles of track with a total of seven cars. Power for this operation also is purchased from the Columbus Railway, Power and Light Company.

The Columbus, Urbana and Western Electric Railway Company connects Columbus, Marble Cliff and Fishingers, operating with twelve cars a total of about ten miles of track. The Columbus Railway, Power and Light Company furnishes power for the operation of this line also.

The Columbus, Delaware and Marion Railway operates a total of sixty miles of track, connecting Columbus with Worthington, Delaware, Prospect, Radnor and Marion. In addition to its interurban operation between these points it operates city service in Marion and Delaware. The company generates its own power and in addition to the amount it uses for the operation of its lines it sells energy to the Prospect Electric Light and Power Company and the Columbus, Marion and Bucyrus Railroad Company. This latter company runs from Marion to Bucyrus, a distance of eighteen miles, thus making a further extension of Columbus' interurban system. It operates its schedules with a total of six cars. The Columbus, Delaware and Marion, in addition to the operations described, sells power in Marion. It puts out energy at a voltage of 19,500 and this is stepped down to a trolley voltage of 600.



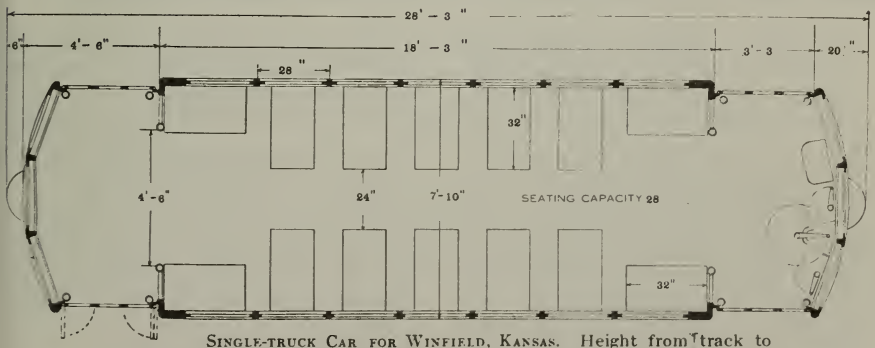
Freight and express car and trailer in use on Scioto Valley lines



Single-Truck Car for Winfield, Kansas

BRILL 21-E TRUCK

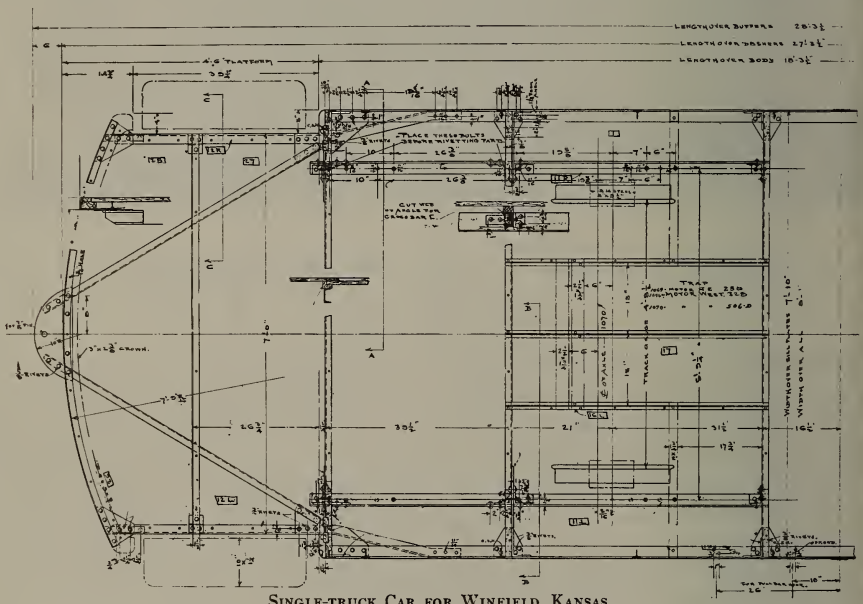
THE American Car Company, of St. Louis, recently completed for the Southwestern Interurban Railway Company, of Winfield, Kansas, an 18 ft. 3 in. closed, single-truck, double-end, straight-side car. This company operates an interurban line between Winfield and Arkansas City. The former has a population of 6,700 and the latter a population of 7,500 (both 1910 census). In addition to its operation connecting these cities the company conducts local service in each of them and it is for this local service that this new single-truck car will be used.



SINGLE-TRUCK CAR FOR WINFIELD, KANSAS. Height from track to under side of side sills, 21 13/16 in.; height from under side of side sills over trolley boards, 8 ft. 5½ in.; height from floor to center of headlining, 7 ft. 8 11/16 in.; track to step, 15 in.; step to platform, 12 5/8 in.; weight of carbody, 8000 lb.; weight of truck less wheels and axles and body pivot plate, 3000 lb.

The car is a duplicate of the type of an order built for the Beaumont Traction Company, of Beaumont, Texas, by the American Car Company, and described in BRILL MAGAZINE for December, 1915. Like this order for Beaumont, the car illustrated herewith is mounted on a Brill 21-E Truck with 24-in. wheels. This lightweight 21-E Truck, which is described also on page 60 of this issue of BRILL MAGAZINE, is creating a very favorable impression in the electric railway field, as is attested by the number of orders that have been received specifying it. The truck has the very decided advantage of reduction in its own weight and also its small diameter wheels swing the car lower to the track, making a material reduction in step heights. In the car shown herewith the use of these small-diameter wheels makes it possible to build the platforms flush with the level of the body floor, which is reached from the ground by two steps, 15 and 12 5/16 in. in height respectively.

The company generates the power it uses for its operation. Its schedules are maintained by the use of a total of eight motor and one other car. Altogether, including its interurban operation, it has a total of 25 miles of track.



SINGLE-TRUCK CAR FOR WINFIELD, KANSAS

The side sills are of angle, the cross sills of channel and the platform knees of channel. The center sills also are of channel and the dashers are of angle

The car is built on a steel underframe. The side sills are of 2½ by 2½ in. angle, extending the length of the car in a continuous piece. The cross sills are of 3 in. 4 lb. channel and are fastened to the side sills with gusset plates,

which are riveted. At the corner posts the cross sills are reinforced to carry the platform knees. These platform knees are of 3 in. channel fastened to the side sills, cross sills and dasher angles and set in 4 in. from the sides of the car. The dasher angles are of 1½ by 1½ in. steel gusseted to the side sills and bolted to the platform knees. The center sills, like the platform knees and the cross sills, are of 3 in. channel.

In the body framing of the car the corner posts are of 1¼ by 1¼ in. angle and the side posts are of 1¼ by 1½ in. tees. Below the windows the panels are of sheet steel. Seat rests, window rests and letter boards all are of steel.

Each platform has a door opening on each side, the openings enclosed with three-part folding doors, opening out. The doors to the right of the motorman are arranged to be operated by him and those on his left are operated by the conductor. When the carbody weight of 8,000 pounds is taken into consideration, the seating capacity of twenty-eight persons is realized to be remarkably good.



SINGLE-TRUCK CAR FOR WINFIELD, KANSAS. This car is a duplicate of the type of cars built for the Beaumont Traction Company, of Beaumont, Texas, and described in BRILL MAGAZINE for December, 1915. The use of the small-wheel, light-weight 21-E Truck is one of the most important features of the car. This truck effects a reduction in the total weight by reason of its own lightness in weight. Also it allows the platforms to be built flush with the body floor, making access to the car easy—by means of two steps, 15 and 12⅞ in. respectively

Semi-Convertible Cars for Reading, Pa.

BRILL 21-E TRUCKS

TWO orders of 19 ft. 6 in. double-end, one-man vestibule motor cars, differing from each other only in a few minor points, have been built by The J. G. Brill Company for the Reading Transit and Light Company, of Reading, Pa. The principal difference between the two types is that those cars belonging to the first order are provided with four transverse seats on each side of the car, whereas the cars of the second order are finished with six cross seats on each side of the car. The first order consisted of an equipment of three cars and the second order, which was such a near duplicate, consisted of ten cars. Brill 21-E Trucks are used under the cars of both orders.

The platforms of the cars are provided with the usual stationary round-end vestibule, sheathed on the outside below the windows and on the inside with sheet steel. Each vestibule front has three windows, all arranged to drop. Each step opening is provided with a four-part door in two sections, one section folding against the vestibule corner post and the other folding against the body corner post. These doors are operated in conjunction with folding steps and the mechanism for the operation of both doors and steps is installed so that the control handles are located directly in front of the motorman, to make the car readily available for one-man operation. The car seats 32.



SEMI-CONVERTIBLE CARS FOR READING, PA. The two orders of which this photograph is an illustration are designed for operation under one man. The doors of the rear platform are closed, and across them are dropped wooden slat seats, which readily fold up against the vestibule. The carbody weighs 23,540 lb.

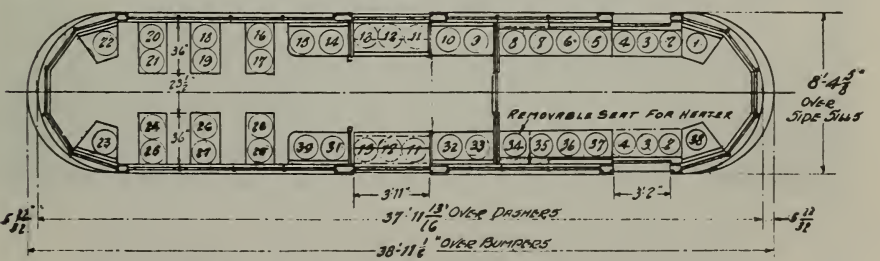


Center-Entrance Passenger and Baggage Car for Lewisburg, W. Va.

BRILL 76-E TRUCKS

THE Lewisburg and Ronceverte Electric Railway Company, of Lewisburg, W. Va., recently received from the G. C. Kuhlman Car Company, of Cleveland, Ohio, a 39 ft. center-entrance, steel-frame, combination passenger and baggage car, mounted on Brill 76-E trucks. This company is a short interurban line operating between Lewisburg and Ronceverte, W. Va., a distance of a little more than six miles. The former has a population of about 4,000 and the latter a total of 1,000 inhabitants. In Ronceverte the company connects with the main line of the C. & O. Railroad, terminating stub-end at the C. & O. station and at the post-office in Lewisburg. For its haul of six miles the company charges a fare of thirty cents, five cents to the mile. Round-trip tickets are also sold at fifty cents.

The company expects through the use of this new equipment to attain better service, easier riding



CENTER-ENTRANCE CAR FOR LEWISBURG, W. VA. Height from rail to first step, 13¾ in.; height from first step to second step, 13 in.; height from second step to car floor, 12½ in.; seating capacity, 38; weight of trucks complete, 13,726 lb.; weight of carbody, less electrical equipment, 20,414 lb.; weight of motors, 8240 lb.; total weight, 42,380 lb.



Center-Entrance Car for Lewisburg, W.Va. The use of the Brill Renitent Post is one of the most important features of the car. This post is watertight, rattle-proof, cannot be racked or broken by careless handling, is easily removed without the use of tools and is readily interchangeable, both from window to window and from car to car, where the dimensions are uniform. In this car wire-mesh screen is pulled out of a pocket as the sash is raised, thus guarding the passengers. The post presents a neater appearance than can be obtained by the use of wood

and greater safety for its passengers. The new type is a great improvement over the design of the old cars used by the company, being a typical interurban car capable of high speed and provided with facilities for carrying mail, express and baggage matter in a compartment entirely separate from the passengers.

The baggage compartment has a sliding door on either side of the car, the door opening being 38 in. wide. There is a removable seat which may be placed before either of these sliding doors, giving the baggage compartment a seating capacity of thirteen. Also, in the main passenger compartment there is a hinged seat which may be dropped before the door which happens to be on the closed side of the car. This gives the main passenger compartment a seating capacity of twenty-five, making the total capacity of the car thirty-eight. There are six transverse seats in the main compartment and a two-person longitudinal seat on either side of the center door. On either side of the motorman's station there is a single seat.

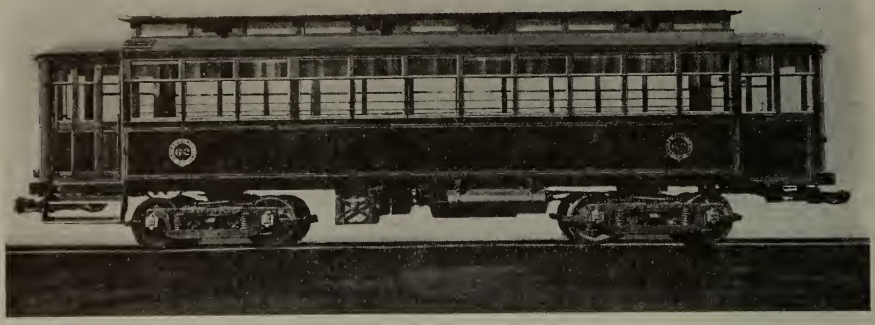
Double-End Cars for Southwest Missouri Railroad

BRILL 27-M. C. B. TRUCKS

FIVE 32-ft. double-end, motor passenger cars, mounted on Brill 27-M. C. B. trucks, have been delivered to the Southwest Missouri Railroad Company, of Webb City, Missouri. These cars, like a large number of other recent orders, were equipped with the new Brill Renitent Post window system. This system, despite its comparatively recent perfection, has found a ready and large favor in the electric railway field, having been specified for a majority of late equipments. Among the orders that have been placed for this system were cars for Boston, Public Service Corporation, Detroit, Dayton and Wilkes-Barre and Hazleton. The sash has many advantages, the most important being that it is rattle-proof, moisture-proof, easily removed without tools, cannot drop suddenly and cannot be racked by careless handling.



DOUBLE-END CARS FOR WEBB CITY, MISSOURI. These cars will be operated between Carthage, Mo., and Galena, Kan. The company has a total tributary population of more than 100,000. The passenger car miles for the year ending April 30, 1916, totaled 2,340,873 and the average gross receipts for interurban and city lines was 32.3 cents per car mile. The operation is practically an exclusive passenger service, although small packages and baggage are carried on the front platforms

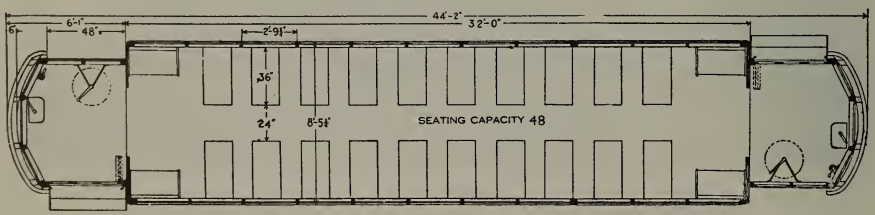


DOUBLE-END CARS FOR WEBB CITY, MISSOURI. The cars ordered by this company always follow a definite standard as regards dimensions and general appearance. However, recent equipment has contained much more steel than did the earlier orders. Smoking compartments embodied in previous orders are being discontinued, the company removing the interior partitions. The cars are sometimes run in trains of two or three cars. They are used for both interurban and city service, giving great satisfaction for both kinds of service

The Southwest Missouri Railroad connects Webb City—whose population is 11,817—with Carthage, Carterville, Prosperity, Duenweg, Neck City, Purcell, Alba and Joplin, Mo., and Galena, Kan. The company operates 76 miles of track with a total of 62 motor and 5 other cars, which total, of course, will be supplemented by the cars of this new order. The company owns and operates a park, called Lakeside Park.

In the underframes upon which the cars were built the side sills were of 3½ by 6 in. angle and the cross sills of 4 in. channel fastened to the side sills with angle brackets. The side and corner posts are of 1½ by 2 by ¼ in. tees extending from sill to center of roof. The underframe has four 5 in. I-beam center and intermediate sills running the full length of the car and fastened to the bumpers. The bolsters are of the built-up type, fastened to the side, center and intermediate sills. The bumpers are of 8 in. channel iron.

There are eight rattan-covered reversible Brill "Winner" seats on each side of the aisle and four longitudinal seats.



DOUBLE-END CARS FOR WEBB CITY, MISSOURI, Height from track to underside of side sills, 37 in.; height from underside of side sills over trolley boards, 9 ft. 4¾ in.; height from floor to center of headlining, 8 ft. 4¼ in.; track to step, 18 in.; step to platform (two steps), 12½ and 12¼ in.; platform to floor, 7 in.; weight of carbody, 18,500 lb.; weight of trucks, less wheels, gears and axles, 8600 lb.

Semi-Convertible Cars for Bangor, Maine

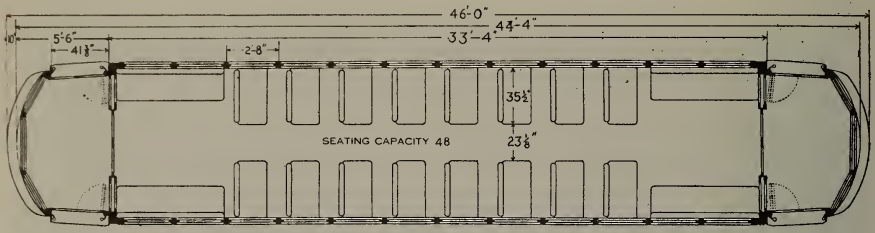
BRILL 27-M.C.B. TRUCKS

TWO 33 ft. 4 in. Brill Semi-convertible motor cars, mounted on Brill 27-M. C. B. trucks, recently were completed and delivered to the Bangor Railway and Electric Company, of Bangor, Maine. The cars are of a large-capacity type, seating 48 persons. The use of the Brill 27-M. C. B. trucks, standard high-speed trucks, makes the car perfectly adaptable to the interurban service for which it was purchased. The cars were ordered for operation on the Old Town Division of the company, a twelve-mile line which serves towns of populations ranging from 500 to 6,500. The towns served include Veazie, Orono, Old Town, Stillwater and Great Works, the latter two being villages incorporated in Old Town. The stops average four to the mile, making the average speed maintained twelve miles an hour.

The University of Maine is located on the line of the company and helps materially the gross revenue. In every village and town served by the company there is located one or more manufacturing industries, which of course aid in boosting the demand for transportation facilities. Besides the Old Town Division the company operates three other divisions, Hampden, Charleston and Brewer, all serving thriving, modern communities, the whole territory covered by the company being plentifully sprinkled with hustling industries. The heavy riding which these industries furnish was the chief factor in determining the proper type of equipment, the car selected having a large capacity, but being comparatively light in weight—48,600 lb.



SEMI-CONVERTIBLE CARS FOR BANGOR. This type is very similar—in fact, practically identical, so far as design of underframe and side body construction is concerned—to the cars built for the Connecticut Company and described in BRILL MAGAZINE for March, 1916. The large seating capacity of the car—48 persons—and the use of Brill 27-M.C.B. trucks make the type perfectly adapted to the interurban service for which they were purchased



SEMI-CONVERTIBLE CARS FOR BANGOR. Height from track to underside of side sills, 2 ft. 10¾ in.; height from underside of side sills over trolley boards, 8 ft. 6 5/16 in.; height from floor to center of headlining, 7 ft. 7 3/8 in.; track to step, 14½ in.; step to platform, 14½ in.; platform to floor, 9 in. and 2¼-in. ramp; weight of carbody less electrical equipment, 18,900 lb.; weight of electrical equipment, 2200 lb.; weight of airbrake equipment, 2000 lb.; weight of trucks, 15,000 lb.; weight of motors, 11,500 lb.; total weight, 48,600 lb.

The roadbed of the company is laid on gravel and is single-tracked for a total of 15 miles, the total mileage of the system being 65. On the Charleston Division freight is carried. The freight operation from June, 1914, through June, 1915, totaled 108-577 carmiles. For the same period the company carried 7,389,154 passengers with a total of 1,265,-223 passenger miles.

In the underframe of the cars, side sills of 6 by 3½ in. angle and outside platform knees of 7 by 3½ in. angle are used. Otherwise, except for the length of the carbody and the platforms, the construction of the underframes is the same as that used for the Connecticut cars, shown in BRILL MAGAZINE for March, 1916. Also, the body side construction is the same as in those cars except for the window spacing and the location of the side signs. The roof is of the Brill Plain Arch type built on concealed steel rafters. The seats are of the Brill "Winner" type. There is provided a longitudinal seat at each corner of the car covering the space of two windows. In figuring the seating capacity of the car as 48 passengers, these longitudinal seats are regarded as being capable of carrying four persons each.



SEMI-CONVERTIBLE CARS FOR BANGOR. The underframes have angle side sills and outside platform knees. The end sills are Z-shape plate, dropping the platform down 9 in. below the level of the car floor. A channel bumper is used. The center platform knees are of channel and crossings of angle. The bolsters are of the made-up type



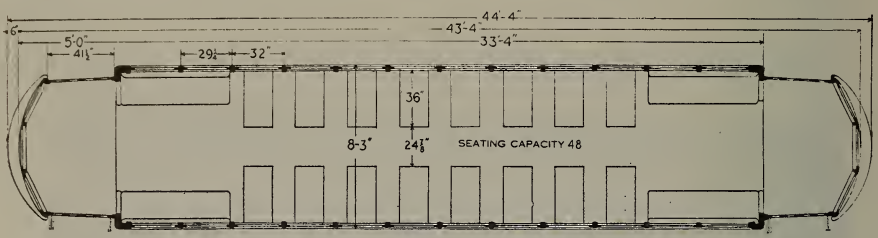
Prepayment Cars for Conestoga Traction Company of Lancaster, Pa.

RENITENT POST WINDOW SYSTEM

THREE 28-ft. prepayment motor bodies mounted on Brill 39-E Trucks and one 33 ft. 4 in. prepayment motor body mounted on Brill 27-M. C. B. trucks recently were shipped to the Conestoga Traction Company, of Lancaster, Pa., by The J. G. Brill Company. The cars are almost identical in type, except for the difference in length. The car mounted on the high-speed 27-M. C. B. trucks is longer by two windows than the smaller car mounted on the single-motor truck. This difference in length is used in the addition of two more transverse seats on each side of the car, thus



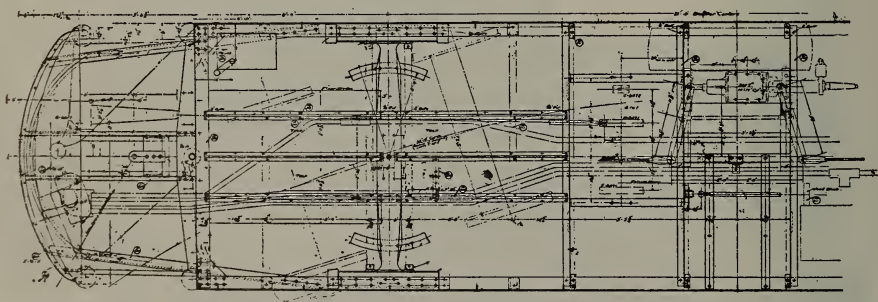
CARS FOR LANCASTER, PA. There are four cars in this order, one long car mounted on Brill 27-M.C.B. Trucks and three shorter cars mounted on Brill 39-E Trucks. The cars are fine examples of the car-builder's art, combining all of the latest improvements



Cars for Lancaster, Pa. Height from track to underside of side sills, 3 ft. 0¼ in.; height from underside sills over trolley boards, 9 ft. 4 in ; height from floor to center of headlining, 8 ft. 6½ in.; track to step, 15 in.; step to platform, 14½ in.; platform to floor, 9⅜ in.; weight of carbody, less electrical equipment, 17,620 lb.; weight of electrical equipment, 2100 lb.; weight of airbrake equipment, 1200 lb.; weight of trucks, 14,380 lb.; weight of motors, 9500 lb.; total weight, 44,800 lb.

increasing the seating capacity by eight persons. The smaller car is a ten-window type. In the corners of each car there are used four longitudinal seats two windows long. Hence, in the small car, there are six cross seats on each side, making a total seating capacity of 40 persons. The four extra cross seats in the larger car bring its seating capacity up to a total of 48 persons. The seats are of the Brill "Winner" type.

In both cars the windows are of the Brill Renitent type. This window system—a recently perfected standard of Brill practice—is the most efficient window system that yet has been devised. In this system the glass is set in metal sash stiles which slide in a casing shaped from spring brass. Tees are used for the side body posts and to these tees the brass casings are attached by means of clips which fasten into stirrups riveted to the T-posts. The brass casings have an elasticity ("Renitent" literally means ability to offer elastic resistance to pressure) which holds the sash securely in place, but which at the same time permits of it being removed from its runways without the use of tools. This elastic pressure of the runways against the sash safe-



Cars for Lancaster, Pa. (Short car.) Height from track to underside of side sills, 2 ft. 10⅝ in.; height from underside of side sills over trolley boards, 9 ft. 4 in.; height from floor to center of headlining, 8 ft. 6½ in.; track to step, 15 in.; step to platform, 14½ in.; platform to floor, 9⅜ in.; weight of carbody, less electrical equipment, 16,460 lb.; weight of electrical equipment, 1390 lb.; weight of airbrake equipment, 1000 lb.; weight of trucks, 9800 lb.; weight of motors, 4750 lb.; total weight, 33,400 lb.

guards the passenger against accidents to hands or arms resulting from the sash dropping suddenly as the result of failure of locks or stops. The Brill Renitent sash is rattle-proof and moisture-proof, cannot be forced from its casings by the casual pressure exerted by a passenger raising or lowering a window, although the removal of the sash without the use of tools is a very simple matter, the glass cannot be racked and broken by careless handling and the sashes are readily interchangeable from window to window and from car to car. One of best and most interesting features of the Brill Renitent Post as applied to these cars is the absence of the ordinary sash locks. The outer face of the sash stile and the contacting edge of the post are provided with enmeshing corrugations which, through the elastic pressure of the sash runways, hold the sash in proper position. Pressure on the bottom of the sash, pulling it directly toward the interior of the car, disengages this rack so that the position of the sash may be readjusted.

In the body framing the T-posts used are 1½ by 2 in. and on the third dimension taper from 3-16 to ¼ in. They extend from the side sill to the top rail. which latter member is of 2½ by 2½ in. angle extending the full length of the car. The corner posts are of 3-32 in. sheet steel.

The cars are mounted upon all-steel underframes in which the dimensions of the members are the same for both types of car. Side sills of 5 by 3½ in. angle are used, the long leg being laid horizontally. At the bolster this side sill angle is reinforced with a 6 by 3½ in. angle to take part of the strain on the horizontal leg of the angle. The end sills are of 3-16 in. pressed steel and the crossings are of ⅛ in. pressed steel, as are also the trap-door supports. The outside platform knees are of 7 by 3½ in. angle, reinforced with 2 by 2 in. angle under the end sill. These outside knees are suspended from the pressed steel end sill. The bumpers are of 6 in. channel.



CARS FOR LANCASTER, PA. The cars are equipped with the Brill Renitent Window Post System, a recently perfected arrangement which is creating a great deal of favorable comment. This Renitent Post has the advantage of furnishing a sash which is water-proof, rattle-proof, safe from dropping suddenly and cannot be racked by careless handling. Also, the sashes may be removed without the use of tools, and they are interchangeable

New Cars for Great Falls, Montana

BRILL 39-E TRUCKS

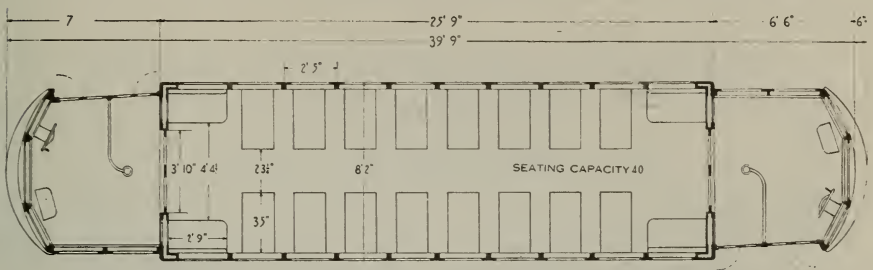
THE Great Falls Street Railway, of Great Falls, Montana, recently has received from the American Car Company seven double-truck, double-end motor passenger cars mounted on Brill 39-E Trucks. This company, which is owned and operated by the Montana Power Company, connects Great Falls, whose population is 13,948, and its suburbs, operating twelve miles of track with a total of twenty cars. The company reaches Black Eagle Park, which is controlled by it. Power for operation is purchased from the Great Falls Power Company.

The cars are built on steel underframes in which the side sills are of 2½ by 2½ in. angle iron, extending the full length of the car. The cross sills are of 4 in. channel fastened to the side sills with gusset plates and the platform knees are of channel iron. In the body framing the body corner posts are of 1½ by 1½ in. angle iron extending from the side sill to the top plate, the side posts are of 1½ by 1½ in. tees, extending up to the top plate, and the rafters are of 5/16 by 1½ in. iron.

There are ten windows on each side of the car, the bottom sash ar-



NEW CARS FOR GREAT FALLS, MONTANA. These cars are designed for double-end operation, and yet they may be used for one-man service by fastening the rear door. There is one door on each platform, at diagonally-opposite corners of the car



NEW CARS FOR GREAT FALLS, MONTANA. Height from track to underside of side sills, 33½ in.; height from underside of side sills over trolley boards, 8 ft. 7⅞ in.; height from floor to center of headlining, 7 ft. 8¼ in.; track to step. 16⅜ in.; step to platform, 14 in.; platform to floor, 9⅝ in.; weight of carbody, 14,000 lb.; weight of trucks, less wheels and gears, 2815 lb.

ranged to raise and the top sash stationary and extending the full length of the carbody. There are six transverse seats on each side of the car and at each corner there is a longitudinal seat covering the space of two windows and accommodating four persons, thus bringing the total capacity of the car up to forty persons, twenty-four on the transverse seats and sixteen on the longitudinal seats. The seats are of the Brill "Winner" type upholstered in rattan.

The vestibules are of the stationary, round-end type, arranged so that the car may be used for near-side operation and so that the motorman can collect the fares, thus converting the car into a one-man type. At each end of the car, at the right of the motorman, there are installed two sets of two-leaf folding doors, both folding outward. These doors are controlled independently of each other, by means of levers. The steps, as usual, are arranged so that they fold in conjunction with the doors. On the side of the platform opposite to the doors there are two windows which are designed so as to conform with the appearance of the front vestibule windows.



NEW CARS FOR GREAT FALLS, MONTANA. The cars are built on steel underframes, the side sills of angle, the cross sills and the platform knees of channel

Two Types of Semi-Convertible Cars for Harrisburg, Pa.

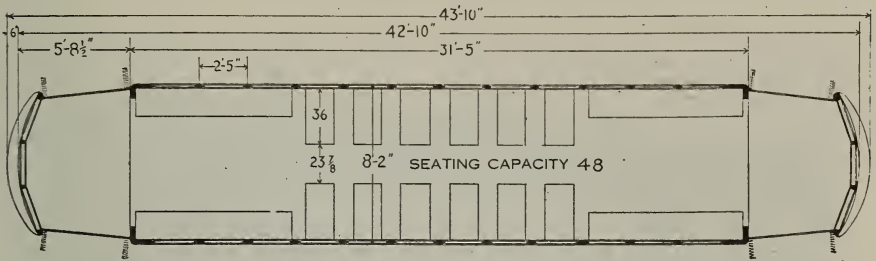
BRILL 27-M.C.B. AND 39-E TRUCKS

THE Harrisburg Railways Company, of Harrisburg, Pa., recently has received from The J. G. Brill Company five new cars, of two distinct types, one order, for two cars, covering 31 ft. 5 in. bodies mounted on Brill 27-M. C. B. trucks and the other order, for three cars, covering an equipment of 25 ft. bodies mounted on Brill 39-E trucks. These latter cars have been selected as the type of a repeat order of five cars, which order probably will be delivered within the course of a few months and will be illustrated and described in a later issue of BRILL MAGAZINE.

The larger cars are very similar to another order built for this same company comparatively recently, but their steel frame construction is the same as that incorporated in the low-level cars built for the Wilmington and Philadelphia Traction Company and described in the May, 1916, issue of BRILL MAGAZINE. In the underframes of the cars side sills of 5 by 3½ in. angle are used with the long leg horizontal. These side sills are reinforced at the bolster with another angle, which relieves the strain on the horizontal leg of the sill. The end sills are of 3-16 in. pressed steel and the crossings of ⅛ in. pressed steel. The bolsters are of cast steel bolted to the side sill and its reinforcing angle. Openings are made in the bolster to permit the passage of brake rods and conduits. The outside platform knees are of 7 by 3½ in. angle reinforced with 2 by 2 in. angle under the end sill. The center platform knees are also



SEMI-CONVERTIBLE CARS FOR HARRISBURG, PA. In addition to the type shown, of which there were two cars, the company recently received from The Brill Company three smaller cars mounted on Brill 39-E Trucks. Five cars, exact duplicates of these smaller cars, are on order and will be shipped in the course of a few months, at which time the type will be illustrated and described in BRILL MAGAZINE



SEMI-CONVERTIBLE CARS FOR HARRISBURG, PA. Height from track to underside of side sills, 2 ft. 11 in.; height from underside of side sills over trolley boards, 9 ft. 1¼ in.. height from floor to center of headlining, 7 ft. 10⅞ in.; track to step, 15 in.; step to platform, 14⅛ in.; platform to floor, 10⅜ in.; weight of carbody, less electrical equipment, 17,000 lb.; weight of electrical equipment, 1550 lb.; weight of airbrake equipment, 1200 lb.; weight of trucks, 13,792 lb.; weight of motors, 7800 lb.; total weight, 41,432 lb.

steel members, of 4 in. channel.

In the body framing the side body posts are of 2 by 2 in. tees tapering from ¼ to 5-16 in. and extending from the side sill to the top rail, being riveted to both. The body corner posts are of 3-32 in. steel extending around the corner and up to the bulkhead opening. The side sheathing of the car is of 3-32 in. steel in three sections.

The roof is of the Brill Plain Arch type, strengthened with 3-32 in. pressed steel U-shaped rafters. Brill "Dedenda" Gongs were specified, as were also Brill Patented Signal Bells. There are six transverse seats on each side of the car, designed with reversible seats and backs. Longitudinal seats are placed on each end of the car, occupying the space of three windows and thus bringing the total seating capacity of the car up to 48 persons.

The advantages of the Brill Semi-Convertible Window System are numerous. By the use of this system a car is made to do all-year-round work. The sashes—upper and lower—are hinged together and are arranged so that they raise into a window pocket in the roof. There they are safe from breakage and it is not necessary to provide storage. Refuse-collecting lower pockets are elmininated.



SEMI-CONVERTIBLE CARS FOR HARRISBURG, PA. The side sills are of angle, the bolsters of cast steel, the end sills and crossings of pressed steel. The outside platform knees are of angle and the inside knees are of channel

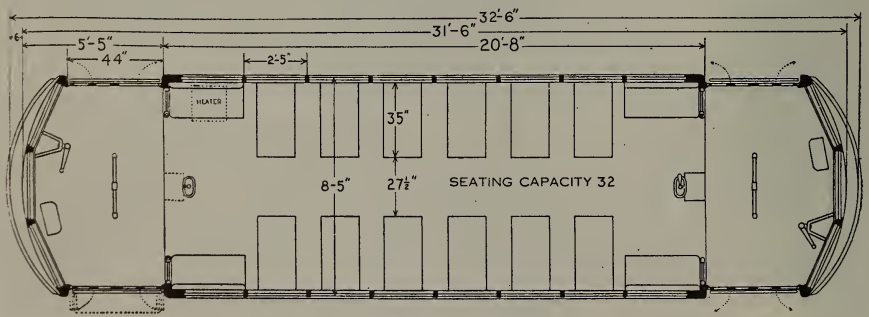


Five Cars for Madison, Wisconsin

BRILL 21-E TRUCKS

THE American Car Company recently has delivered to the Madison Railways Company, of Madison, Wisconsin, five 20 ft. 8 in. prepayment closed motor cars, mounted on Brill 21-E trucks. The Madison Railways is the successor to the Southern Wisconsin Railway Company, the change in name having been made within the last year. The company operates 16 miles of track with a total of 40 motor and 7 other cars, to which these new cars will form a substantial supplement. Energy for the operation of its lines is purchased from the Madison Gas and Electric Company.

The type of car purchased by the company is the development of



FIVE CARS FOR MADISON, WISCONSIN. Height from track to underside of side sills, 31⅝ in.; height from underside of side sills over trolley boards, 8 ft. 10⅝ in.; height from floor to center of headlining, 8 ft.; track to step, 16 in.; step to platform, 13 in.; platform to floor, 9 in.; weight of carbody, 9100 lb.; weight of truck, less brake shoes, pilot boards and life guards, 2820 lb.

a design based on the experience of the company over the period of the last ten or twelve years. Nearly all of the details of the car have been worked out from a carefully recorded study of past performances. The company is a firm believer in the single-truck car because of its advantage of being less costly to operate and therefore being capable of rendering more frequent service. Also, close attention was given to the question of weight, with the object of designing a car of moderate weight and of unquestioned durability. In the reduction of weight care was taken to see that stamina was not sacrificed and that the car will stand up under severe service conditions.

In the underframes upon which the cars are mounted side sills of 2 by 2½ in. angle are used. The end sills are of 6 in. channel, the bumpers of 5 in. channel and the intermediate sills are of 4 in. channel. The outside platform knees are of 6 in. channel and the center platform knees are of 3 in. channel. The platform is braced by 1½ by ¼ in. bars and the first panel inside the end sills is braced in the same manner.

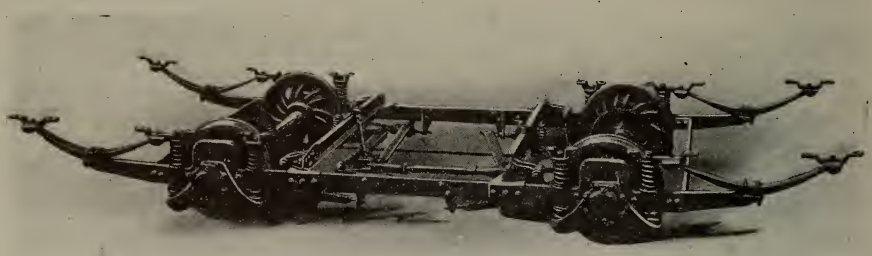
In the upper framing 1½ by 1½ by 3-16 in. tees are used, the belt rail is of 1½ by 2 in. angle and the top rail is of 2 by 2 in. angle. The seat rail is of ¼ by 2 in. steel and the girder plate is of 3-32 in. sheet steel.

The use of the Brill 21-E Truck under this car is an outstanding feature. The popularity of this truck over a long range of time speaks very eloquently for the efficiency of the truck's design for the work it has to do. Its use under the light-weight, economical, single-truck cars which recently have been built in such large numbers is predominant.

The weight of the carbody also is an important feature—the total of 9,100 lb. being indicative of the economy that will be effected by the use of the car. The truck weighs 2,820 lb., keeping the total weight below 12,000 lb., which is worthy of more than passing notice.



FIVE CARS FOR MADISON, WISCONSIN. This type of car was purchased by the company as the result of a careful study of the operating conditions of the company and its experiences over the period of the last ten or twelve years. Nearly all of the details of the cars have been worked out from a carefully recorded study of past performances of the company's equipment. The carbody weight of 9100 lb. is worthy of note



Brill Light-Weight 21-Truck Finds Immediate Favor in Railway Field

NEW DESIGN EFFECTS SAVING OF 1800 POUNDS

A VERY important step in car-design improvement, especially in view of the present popular favor for light-weight equipment, is the designing of a Brill truck of the type of the well-known 21-E, but lighter in weight by about 1,800 pounds than the regular 21-E. This new truck was arranged to carry a car whose weight when empty was 8,640 pounds and it will take care of a passenger load of 9,000 pounds. Complete it weighs but 3,800 pounds.

The truck is built with wheels of 24 in. diameter and with a wheelbase of 8 ft. The use of the small wheels is a decidedly advantageous feature, because with them it is possible to increase the wheelbase by as much as 6 in. over the length of wheelbase that would be the limit were 33 in. wheels used. Even with this increase of 6 in. in the wheelbase the truck still will curve as freely as will the regular 21-E with 33-in. wheels and the shorter wheelbase.

Several features made it possible to reduce the weight of the truck. In the first place, the carbody weight and passenger-load weight being somewhat limited as compared to the regular 21-E Truck, it is possible to use a lighter brake rigging, smaller axles, lighter springs and a side bar that is made a little lighter than usual—none of these changes in construction affecting the service of the truck or its longevity, however. Also, the motor is somewhat smaller than the ordinary motor, thus effecting another material reduction in weight. In addition, the brake rigging was changed from outside to inside brakes. This change in brake rigging effected a reduction of 300 pounds, making a total saving of about 1,800 pounds in the weight of the truck.

Attention is called to a special bulletin on this truck which will be ready for distribution in the very near future. A list of companies using this truck will be incorporated in this bulletin.



Motor-buses for Havana Electric

12- AND 22-PASSENGER BODIES

THE Havana Electric Railway, Light & Power Company has purchased a fleet of ten storage battery buses from The J. G. Brill Company, the order being divided equally between a 16 ft. 11 in. type, seating 22 persons, and a 12 ft. 8⅜ in. type, with a seating capacity of 12 persons. These buses are of peculiar interest because of the choice of storage current as the motive power over the internal combustion engine so frequently used in buses of the same type. All of the buses are mounted on General Vehicle Company chasses.

Havana commands the trade of the entire western half of the island of Cuba, and is recognized as the commercial and banking center of the Republic. Great



MOTOR-BUSES FOR HAVANA ELECTRIC. These buses are of unusual interest because of the use of storage electricity for their motive power in place of the internal combustion engines so commonly used in buses of the type. The order (ten buses) is evenly divided between a large 22-passenger bus and a smaller bus whose seating capacity is but 12 persons



MOTOR-BUSES FOR HAVANA ELECTRIC. These buses are for use in connection with the system of the Havana Electric Railway, Light & Power Company, which system is a very efficient one in spite of the handicap imposed upon it by the narrowness of the streets of Havana. In addition to the local street railway system of Havana and the lighting and power business of the city, the company conducts an interurban line which is a good revenue produeer

Britain and the United States are its principal customers, buying tobacco and sugar in large quantities. Also, Havana ships annually a vast amount of fruit, rum, wax, honey, oils, starch and fine cabinet woods.

The street railway system of Havana is operated by the Havana Electric Railway, Light & Power Company, which also operates the Insular Railway, an interurban line connecting Verado, the most fashionable residential district, located to the northwest of the city, with Mariano, an adjacent town. The service of the company is being extended steadily, and these new buses will be of undoubted assistance in this extension work. The narrow streets of the city place a very definite restriction upon the trolley equipment of the company, necessitating the use of a single-truck car. The standard car in use is a closed car with an open platform and mounted on a Brill 21-E truck.

The bottom frame upon which these bus bodies are built is made up of white oak, including the side sills, end sills and crossings, and the body framing, including corner and side posts, is of ash. The buses are sheathed with sheet steel.

There is a transverse seat at the rear end of the bus, and also a small seat for one person on the left-hand side of the door. The seats and backs are of ash slats.

SUGGESTIVE SUBJECTS

Note.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

AN EXPLANATION OF THE BRILL RAILWAY PUBLICITY SERVICE

SEVERAL recent requests for assistance in the handling of their publicity work, received from railway managers as a result of our recent announcements concerning the inauguration and operation of the Brill Railway Publicity Service, have led us to the conclusion that even yet the Service has not been properly explained. Some requests have been received asking us to forward "the information which you have collected from the various railway companies of the field." The nature of these requests is regarded by us as proof of the fact that there exists a misunderstanding in regard to what the Service really is.

Such a thing as the compilation of all the data, all the information we have received from the railway field in general as the result of our close touch with it through correspondence relative to BRILL MAGAZINE would be somewhat out of the question. The Service means something entirely different from that. It is primarily intended to furnish material for newspaper, circular and other forms of railway publicity, and its object is to throw the publicity department of The Brill Company into direct touch with each manager's separate and distinct publicity problem, so that each situation may be handled separately and personally.

No effort is spared in trying to make this Service efficient and in order to be of the most good to the managers making use of the Service we have deemed it necessary to handle each situation separately. The idea is for managers who feel themselves in need of our assistance to write us candidly as to their local situation, telling us whether the problem to be solved concerns jitney competition, more economic operation with one-man cars (to which there may be some objection on the part of the local authorities), or general good-will "policy" advertising. With this definite information in hand we give the problem careful and individual consideration, preparing "copy" of what we consider to be the proper sort, and going into the matter thoroughly and painstakingly with the manager. Such a thing as the preparation of general information to be sent out broadcast to the electric railway field would be out of the question, as the problems of the manager in one city differ so widely from those of the manager in his neighboring town, etc.

In short, our Service simply means that we serve as a long-distance publicity man to the railway not employing such a man, and our services are continually at the disposal of the manager and also are available without there being the slightest obligation on the part of the one making use of them. In many cases, too, we have had the pleasure of co-operating with local publicity agents. There is absolutely no charge for this Service of ours and we want its users to feel there is no obligation assumed on their part, not even to the point of feeling obliged to make use of what material is prepared by us.

Let us go over your publicity work with you, with the definite understanding as just stated as regards remuneration for whatever we may have the pleasure of doing for you. If the material we prepare is not regarded by you as being suited to your problem no feeling of ill-will will be created if none of it is used. It will cost you nothing to give this Service a trial, except the trouble to write us a letter telling plainly of the problems you are facing and would like solved.

CHANGES IN BRILL MAGAZINE MAKE-UP

WE wish to call attention to several changes that have been made for the better in the typographical arrangement of BRILL MAGAZINE. These changes involve the article headings, the advertising pages and the Suggestive Subjects pages in which this notice is appearing. In these Suggestive Subjects pages the size of the type has been reduced somewhat and the pages have been divided into two columns, with the view of publishing more material in the space available and of presenting that material in a more readable style. The advertising pages have been cut in half and instead of one advertisement to the page there now are appearing two advertisements, illustrated by line cuts, which we regard as a pleasing change from the half-tone illustrations formerly used. This halving of the advertising pages gives us a chance to set before the electric railway field each month more of the news of Brill products and the improvements that are being made on them than we heretofore have been able to do.

AND TWENTY YEARS FROM NOW—

WHERE will you be twenty years from now? What will you be doing? What sort of a success will you have attained? "Not a fortune-teller," do you say? Nobody ever intimated you need be—there's no relation between predicting a future for other people and looking twenty years along the thread of your own life. It's only the small man who can't tell you pretty close to what he'll be doing twenty years from now. The get-up-and-hustle chap had it all doped out from the start. He knows where he's pointing and he'll "believe" himself into landing there, see if he doesn't. How about the chap that was just promoted from his platform job? Watch him blaze a trail until you, too, "believe," and then let's see you get a hump on yourself and leave him standing still.

A NEW SERIES OF BRILL ADVERTISEMENTS

A RADICAL change has been made in the style of the Brill Advertising appearing in the *Electric Railway Journal*—a change which possesses at present a very decided advantage over the former series of advertisements, in that the emphasis is laid upon the text and rather less prominence is given to the illustration, the reading matter in the former series having been somewhat subordinated by the illustration. Pen drawings are employed to illustrate this series because their clearness of detail enables them to be reproduced in quarter the space necessary to obtain equal clearness in the reproduction of a photograph. Besides subordinating itself to the text, the small illustration leaves ample room for type matter and also for generous margins which have much to do with making the whole advertisement attractive and readable.

A FOUR-YEAR INDEX OF BRILL MAGAZINE

WITH this issue, as an inserted supplement, there appears an index of BRILL MAGAZINE for the last four years which we feel justified in recommending to the readers of our publication as a ready means of reference to the types of cars and other items of equipment that have been built by The Brill Company and its subsidiary plants during this period. The really important changes in modern car design—that is, the changes which have brought the trolley car up to its present high point of perfection—have been made within the last four years, and, therefore, this four-year index of BRILL MAGAZINE will cover all of these important and interesting changes. This index has been prepared very carefully, and we recommend it to those of our readers who desire to look up anything in any one of the back issues as a handy and accurate means of doing so.

T-H-I-N-K is but another way of spelling success.

BRILL RENITENT POST



A POST that will not rattle, will not warp and stick, is moisture-tight and easily removed without the use of tools—that is the Brill Renitent Window Post. Besides, the post is readily interchangeable, from window to window, and from car to car, where the specifications are the same. Thus the necessity for fitting is obviated—an advantage that to a large extent accounts for the tremendous favor already created for itself by the post.

The post is much neater and presents an appearance infinitely superior to the ordinary wooden type of post. The spring-brass casing in which the sash slides makes it safe from dropping should the locks fail.

THE J. G. BRILL COMPANY

Main Office

PHILADELPHIA, U. S. A.

Cable Address: "Brill," Philadelphia

London Office

110 CANNON ST., E. C.

Cable Address: "Axles," London

AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS

Cable Address: "Bogibril," Paris

Agencies

AUSTRALASIA—Noyes Brothers, Melbourne, Sidney, Dunedin, Brisbane, Perth

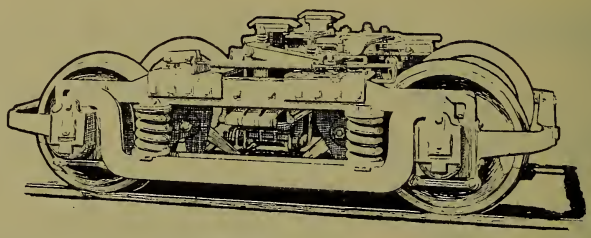
BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158. Buenos Aires

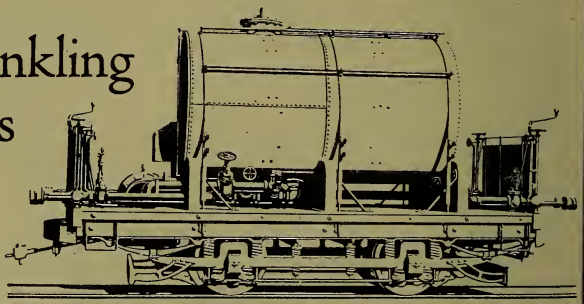
NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

BRILL 27-M.C.B. TRUCK



THE popularity of the Brill 27-M.C.B. Truck ever since its introduction to the field has been most remarkable, but the recent addition of three exclusive Brill devices has created for the truck an even greater favor—if that would seem possible. These new devices are the Brill Bolster Guide, Side-swing Dampener and Graduated Spring System. Of course, as heretofore, the sideframes are solid-forged, a distinctive Brill feature and one that means much to the companies using the truck.

The Sprinkling of Streets



SOON King Winter, already in his death throes, will give up the ghost and his cold, blustery days will be usurped by the warm weather of spring and summer, with their hot, blistery, drier-than-punk days. Once more the problem of getting ready for those dust-laden streets presents itself. Low-hung trolley cars bowling along over dirty, unwatered streets cannot fail to kick up clouds of dust which will create a distaste for riding on the part of the public, filling the cars with a lung-choking, disagreeable atmosphere that makes breathing most uncomfortable. A power sprinkler will do away with all this.

VOL. 11 MARCH, 1917 NO. 3

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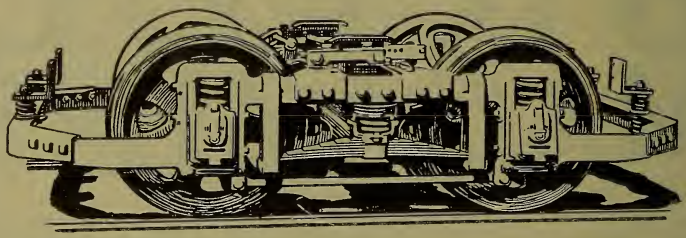
BRILL MAGAZINE

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THE BRILL 76-E TRUCK



THE 76-E has scored a very decided success for city service, especially for operations where existing track conditions, grades, etc., make the use of two motors desirable. The truck is very similar in design to the ever popular Brill 39-E. The spring arrangement is the same on both trucks, the chief point of difference being in the number of motors and in the size of wheels, the 76-E having wheels of equal diameter, whereas the 39-E is a pony-wheel truck

RETRIEVER SIGNAL BELL



THIS bell does away with the old trouble of failing to recover the slack cord. The clapper is long and heavy enough to jump up against the bell with an astonishing amount of energy. No matter how gently the cord is pulled there is no chance of the bell failing to produce a clear note that does not clang and chatter. Because of the arrangement of the trigger which actuates the clapper a comparatively small amount of pull on the cord is necessary. All advantages that are worth investigation



Richard McCulloch

PRESIDENT, UNITED RAILWAYS COMPANY OF ST. LOUIS

SUPPLEMENT TO BELL MAGAZINE
MARCH 1917

As a chain is only as strong as its weakest link, and the speed of a fleet only as fast as its slowest collier, so in a measure is the efficiency of an organization only as great as individual efficiency makes it. This is peculiarly true of street railways. The very nature of the operations makes it impossible to give personal supervision to every operator at all times, and therefore in its dealings with the public the company's responsibility largely devolves upon the employe. To the patron the individual employe often becomes the company.

Among the resolutions that employes should earnestly try to live up to is the practice of courtesy. Next to Safety First this should be their slogan. Under all circumstances—and some of them may be very trying—employes should endeavor to impress upon the traveling public through their courteous and considerate treatment that the chief aim of the company is to give good service.

—Richard McCulloch.

BRILL MAGAZINE

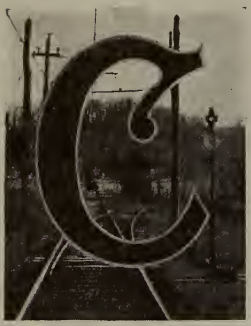
VOL. 11—NO. 3 Copyright, 1917, by The J. G. Brill Company, Philadelphia, U. S. A. MARCH 15, 1917

RICHARD McCULLOCH

RICHARD McCULLOCH, President of the United Railways Company of St. Louis, was born in St. Louis County, June 3, 1869. He attended the St. Louis public schools and Washington University, St. Louis, and was graduated from Washington University in 1891 with the title of Mining Engineer. The honorary degree of Master of Arts was conferred upon him by Washington University in 1905. He spent the summer of 1891 with the United States Geological Survey in Missouri, Arkansas and Indian Territory, and spent 1891 and 1892 at Catorce, Mexico, as agent for the Guggenheim Smelting Company of Monterey, Mexico. In 1893 he became connected with the National Railway Company of St. Louis as Chief Engineer. He was connected with this company in this capacity until 1899. During that time he converted about fifty miles of horse railway and fifteen miles of cable railway to electric traction. From 1899 to 1901 he engaged in electric railway work in France and Switzerland for an English and American Company. During this time he reported on numerous electric railway projects and installed an electric railway in Geneva, Switzerland. From 1901 to 1904 he was with the Chicago City Railway Company as Assistant General Manager. From 1904 to 1906 he was Assistant General Manager of the United Railways Company of St. Louis, and from 1906 to 1914 was Vice-President of the same company, being elected President of the company in 1914. Mr. McCulloch is a member of the three national engineering associations and of various clubs and societies of St. Louis. He has written various articles on engineering and street railway subjects for the technical press, for the American Electric Railway Association and for local societies.

Interurban Centers and Interurban Cars

PITTSBURGH

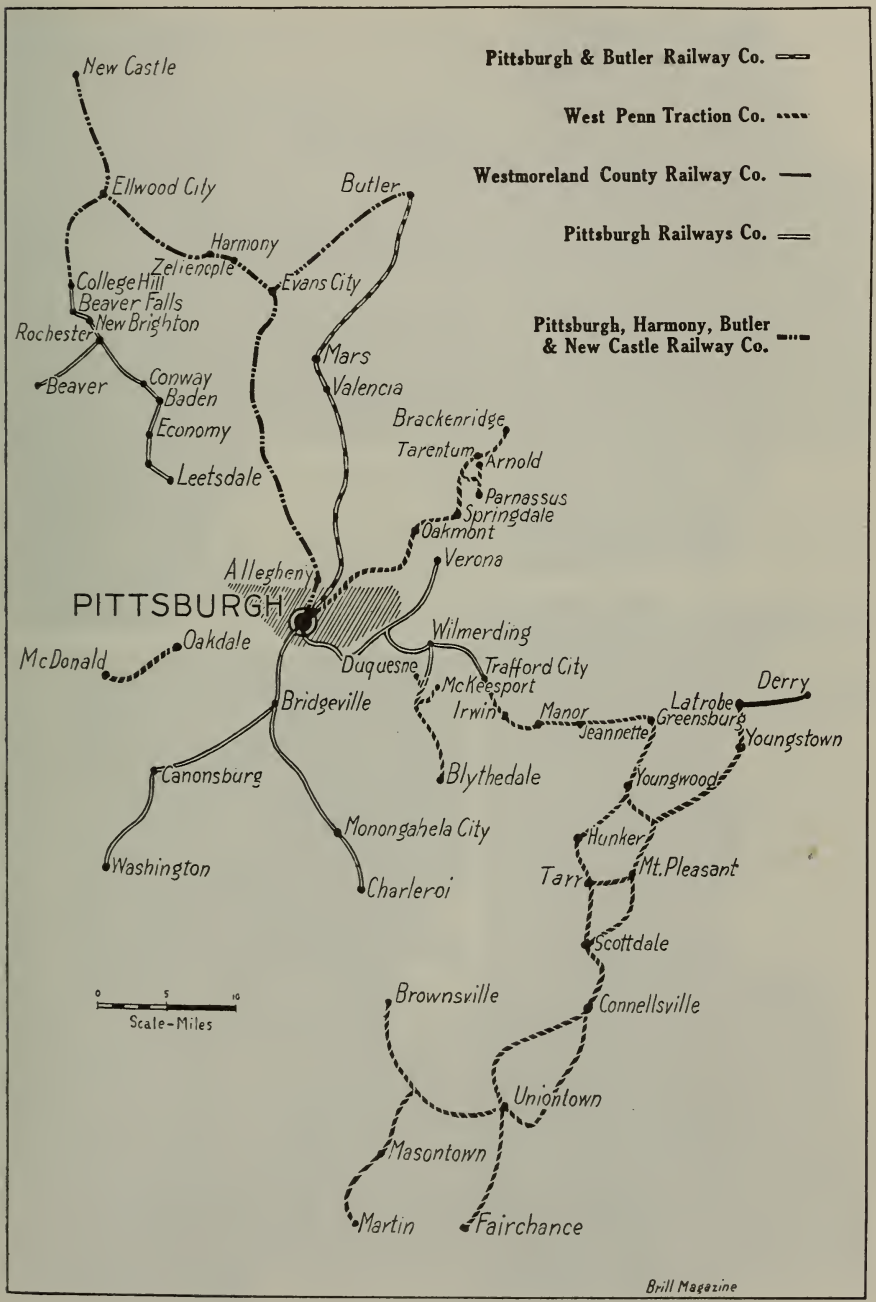


COUNTY seat of Allegheny County and second largest city in the State of Pennsylvania, Pittsburgh is located on the Allegheny, Monongahela and Ohio Rivers very nearly midway between New York and Chicago. The city in 1910 (following the annexation of Allegheny) had a population of 533,905 and an area of 41 square miles. In addition to its extensive steam road service and its well-built-up electric interurban lines, the city is served by river boats plying on all three of its rivers.

The city is built upon rolling plateaus and its three rivers with their narrow valleys and high hills and precipitous bluffs make a picturesque setting for it. Fifth Avenue, which is illustrated on the cover of this issue of BRILL MAGAZINE, is the principal business thoroughfare. The retail houses, wholesale houses, banks, tall office buildings, hotels, theatres, etc., are located in what is known as "The Point," being the part of the city formed by the confluence of the Allegheny and Monongahela Rivers. Factories are strung along the banks of all three of the rivers for miles, extending out into the tributary territory, and it is from these factories—or, more especially, from their large number—that the city gets its nickname, "The Smoky City." The attractive residential districts are located on the plateau in the eastern portion of the district between the Allegheny and the Monongahela Rivers and on the hills which overlook the Allegheny River from the north.

Pittsburgh is located in the midst of one of the most productive coalfields in the country. The region is productive also in petroleum and natural gas. The city is located on one of the main lines of communication between the east and the west, is the center of a vast railroad system and has freight-yard capacity for 60,000 cars. It has a harbor frontage on the three rivers of 27 miles. Coal is brought in from the coalfields by boats on the Allegheny and Monongahela Rivers, as well as by rail, and great fleets of barges carry coal and other heavy freight, such as steel rails, ties and sheet iron, down the Ohio in the spring and winter. The railroads also have a heavy tonnage of coal, coke and iron and steel products, and a large proportion of the iron ore that is produced in the Lake Superior region is brought to Pittsburgh.

The manufacture of glass also


Pittsburgh & Butler Railway Co.
West Penn Traction Co.
Westmoreland County Railway Co.
Pittsburgh Railways Co.
Pittsburgh, Harmony, Butler & New Castle Railway Co.
New Castle
Ellwood City
Butler
Harmony
Zelienople
College Hill
Beaver Falls
New Brighton
Evans City
Rochester
Beaver
Conway
Baden
Economy
Leetsdale
Mars
Valencia
Brackenridge
Tarentum
Arnold
Parnassus
Springdale
Oakmont
Verona
Allegheny
PITTSBURGH
Wilmerding
Oakdale
McDonald
Duquesne
Trafford City
McKeesport
Irwin
Manor
Jeannette
Latrobe
Derry
Greensburg
Youngstown
Youngwood
Bridgeville
Canonsburg
Blythedale
Monongahela City
Washington
Charleroi
Hunker
Tarr
Mt. Pleasant
Scottdale
Connellsville
Brownsville
Uniontown
Masontown
Martin
Fairchance
0 5 10
Scale-Miles
Brill Magazine









Morado Park—intersection of Beaver Valley Traction Company and Harmony Route

Station at Keown

HARMONY ROUTE]

Passenger and freight station at Ingomar

Power-house at Harmony Junction



Interurban Centers and Cars. Koppel Bridge, spanning the Beaver River—Harmony Route

is of great importance to the city. At one time Pittsburgh outranked all other American cities in the manufacture of this product. The output of the city proper no longer is the largest in the country but there are glass-manufacturing cities and towns within the immediate vicinity which bring the importance of the industry up to a high point. At Washington, Charleroi and Tarentum (all of which are shown on the accompanying map) are located glass factories whose outputs are considerable.

Pittsburgh's interurban service is derived from five principal companies. These companies in turn own or control other companies whose operations bring the total interurban system up to a very high point. The principal companies are the West Penn Traction Company, Pittsburgh Railways Company, Westmoreland County Railway Company, Pittsburgh & Butler Railway Company and the Pittsburgh, Harmony, Butler & New Castle Railway Company. No attempt can be made in the space available to describe each company in the detailed fashion which its importance as a railway would



"Party car" in use on Harmony Route

warrant, the idea simply being to give an outline of the operation and to tell of its connection with the interurban system of the city.

The Pittsburgh Railways Company operates the city system of the city, and in addition maintains interurban and suburban lines which link Pittsburgh with such neighboring places as Allegheny, Wilmerding, McKeesport, Duquesne, Monongahela City, Charleroi, Washington and other more unimportant places. In addition to linking these cities and towns together, the company maintains urban operation in each of them.



Interurban Centers and Cars. Shelter house at Elfinwild—Pittsburgh & Butler Railway

The operation of the company requires the use of something over 2,000 cars. This total recently was supplemented by the purchase of an order of steel, center-entrance, two-compartment cars. These cars, which are for use on the division of the company extending out to Charleroi, are described in this issue of Brill Magazine in the article immediately following this. Some idea of the service which will be rendered by these cars may be had from a reference to the accompanying map.

Energy for the operation of its lines is purchased by the company from the Duquesne Lighting Company. Repair shops are located at Allegheny, Homewood, Rankin, Glenwood, West End and South Side. The lines of the company reach Kennywood and Beachwood Parks and Duquesne Gardens.

The extent of the operation of the West Penn Traction Company is best understood by referring to the accompanying map, which shows the location of the lines of the company and gives an idea of the number of cities and towns served and the size of the total population reached by the company.

The company operates more than 300 miles of urban and interurban track. This trackage is divided into three territories. One is the coke region territory, which extends through Westmoreland and Fayette Counties; another is the Wheeling territory, which consists of city lines in Wheeling and extends across to cities in Ohio and also embodies interurban lines running out of Wheeling to points north and south on both sides of

the Ohio River; and the third territory consists of unconnected roads operating at various points within fifty miles of Pittsburgh. None of these three territories has connecting links with the others and in the third territory just described the individual roads do not even connect with each other.



INTERURBAN CENTERS AND CARS. Power-house at Renfrew, on Pittsburgh & Butler Railway

The company operates a total of more than 400 cars, of which number 300 are passenger cars. It owns Olympia and Soisson Parks and reaches Shady Grove. It maintains a repair shop at Connellsville and gets its power from a plant leased by the West Penn Power Company. The West Penn Railways Company controls a large number of companies and is in its turn controlled by the West Penn Traction Company, which is a holding company controlled by the West Penn Traction & Water Power Company.

The Pittsburgh & Butler Railway Company is the result of the merger of two companies, the Pittsburgh & Butler Street Railway Company and the Butler Passenger Railway Company. The former owned the interurban lines between Pittsburgh and Butler, and the latter owned and operated the city lines in Butler. Affiliated with the company is the Butler County Light Company.

The company operates 52 miles of track, including 5.5 miles which belong to the Pittsburgh Railways and over which the company oper-



Station at Wildwood—Pittsburgh & Butler Railway



INTERURBAN CENTERS AND CARS. "Flyer" car in use on lines of Pittsburgh & Butler Railway

ates under agreement. The entire line is single-tracked. The company generates its own power at Renfrew, the plant being steam-operated and having a present capacity of 3,000 kw. The line is operated under 1,200 volts, the transmission voltage being 22,000. Substations are located at Gibson, Mars and Butler.

The standard car in use on the company's lines measures 49 ft. 11 in. over the vestibules, 51 ft. 3 in. over the bumpers, 8 ft. 3 in. over the side sheathing, has a seating capacity of 52 and a carbody weight of 30,000 lb., the car and truck complete weighing 75,000 lb. The cars are of the double end type and are built on steel underframes with wooden side construction.

Miscellaneous freight and express business is carried on by the company, being handled in less-than-carload lots. A fair idea of the size of the operation may be had from the following statistics, covering one year: Number of passengers carried, 2,705,195; car mileage, 1,116,663; tons of freight carried 9,793. The use of the high-voltage, direct-current system in place of the single-phase system on the line is of special interest, the road having been the fifth in the country to substitute 1200-volt dc. for the single phase. Following the change the same carbodies were maintained and the new motors used were of the same normal rating as the old motors. Power was supplied as be-



Interior of "Flyer" car on Pittsburgh & Butler Railway

fore and from the same plant and the schedule was not disturbed. Early results under the new conditions showed a decrease in the power consumption, this decrease being about fifteen per cent., figured per car mile.

The Pittsburgh, Harmony, Butler & New Castle Railway Company operates 68 miles of single track and 11 miles of double track, located as shown on the accompanying map. It serves Butler, 20,000; New Castle, 35,000; Ellwood, 7,000, and Beaver Valley, 30,000. In addition there are about twelve other towns along the lines of the company which have populations ranging from 200 persons to 2,000.



INTERURBAN CENTERS AND CARS. Shelter station at Renfrew—Pittsburgh & Butler Railway

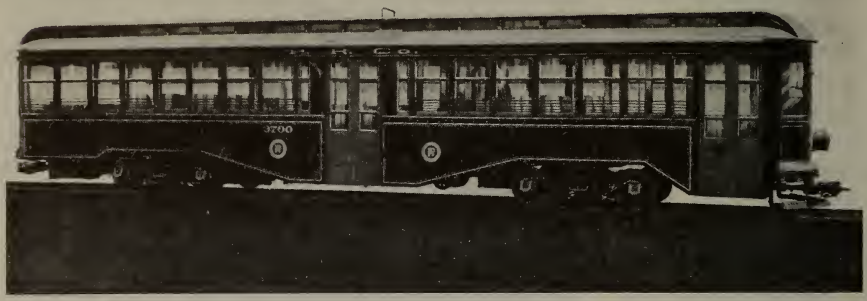
The standard car in use by the company measures 45 ft. over the vestibules, 47 ft. over the bumpers, has a seating capacity of 50 and a carbody weight of 13 tons, the car and trucks fully equipped weighing 33 tons.

Statistics of the company for a year show a total of 2,455,878 passengers carried, with a car mileage of 1,598,723, and a total of about 33,000 tons of freight handled.

The Westmoreland County Railway Company connects Latrobe and Derry, as shown on the map. Energy is purchased from the West Penn Electric Company. The company operates a total of seven miles of track and has an equipment of three cars.



Butler freight station, on Pittsburgh & Butler Railway

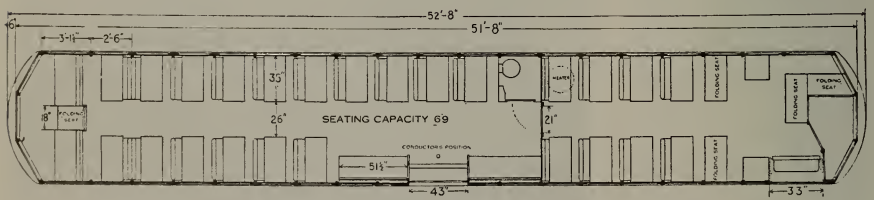


CENTER-ENTRANCE CARS FOR PITTSBURGH. The design of this car, built for use on the Charleroi division of the Pittsburgh Railways Company, is expressly adapted to interurban work, the general arrangement of the car being good and the smoking compartment feature being particularly advantageous

Center-Entrance Passenger and Smoking Cars for Pittsburgh, Pa.

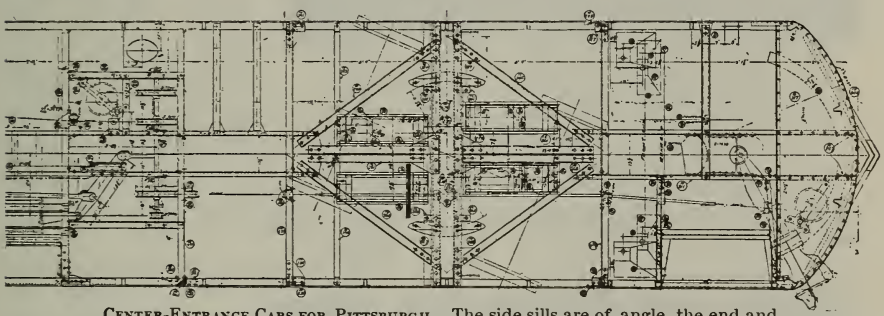
FOR INTERURBAN SERVICE

FIFTEEN 52 ft. 8 in. center-entrance passenger and smoking interurban cars recently were completed by The J. G. Brill Company for the Pittsburgh Railways Company, of Pittsburgh, Pa. This type, which is illustrated herewith, is one of the most efficient of modern car designs. The combination of center entrance and front exit has been found to be a very good one, cutting down the time ordinarily required in loading. The rear compartment of the car is the main passenger compartment. The center entrance forms a direct means of ingress into this compartment. By means of a heavy ramp in the floor the height of this center entrance is reduced by one step as compared with the height at the front door, at which three



CENTER-ENTRANCE CARS FOR PITTSBURGH. Height from track to underside of side sills, 2 ft. 6⅜ in.; height from underside of side sills over trolley boards, 8 ft. 9 in.; height from floor to center of headlining, 8 ft. 1½ in.; track to step, 14½ in.; step to floor (at center door), 9½ in.; 8½ in. longitudinal ramp; weight of carbody, less electrical equipment, 25,000 lb.; weight of electrical equipment, 9500 lb.; weight of airbrake equipment, 2300 lb.; weight of trucks, 9330 lb.; weight of motors, 9140 lb.; total weight, 49,270 lb.

steps are necessary. The well at the center door is brought down gradually so that the slope extends far enough in either direction from the door to make the floor safe and easy to walk on. This reduction of height at the center door is an important feature of the car, making ingress easier and consequently materially reducing the loading time. The third step at the front door does not interfere with the efficient operation of the car, it being comparatively easy for passengers leaving the car to negotiate the extra step without the loss of time.



Center-Entrance Cars for Pittsburgh. The side sills are of angle, the end and cross sills of pressed steel channel and the bolsters of the built-up type. The center sills and bumpers also are of channel

Every effort is made by the company to foster public favor for its operation and to this end the addition of this new equipment to its lines has been a large help. These fifteen cars are for use on the company's line which connects Pittsburgh with Charleroi. For some little time before the receipt of the new cars advantage was taken of every opportunity to impress upon the public the desire of the company to improve its service wherever possible. The new equipment was extensively advertised as being on order and immediately upon its receipt the first car was placed on exhibition for the public. It was viewed by large crowds and was also operated over short runs, keeping, of course, out of the way of the regular schedule of the company. The results of this publicity work have been marked and the public sentiment that has been created favorable to the new cars is a definite and satisfactory result of that publicity work. Incidentally, this company, among others, has realized the great advantage to itself of using the effective advertising medium which the interior of the car presents. Large placards setting forth "good-will" or "policy" messages are posted on the toilet compartment, which is at the front of the main passenger compartment and these placards therefore are readily visible to all the passengers. Another important appeal to public favor is effected through the seats facing the rear, across the end of the car, which seats are used as "observation" seats and as such are tremendously popular with the patrons of the company.



CENTER-ENTRANCE CARS FOR PITTSBURGH. The company does extensive publicity work and loses no chance to lay its operation before the public in a favorable light. "Good-will" placards are posted in the cars, "copy" being kept up-to-date. The results from this work have been more than satisfactory

The cars are equipped with the most modern devices of car design including air operation of the doors. Fares are collected and registered by the conductor. The same rod which is used to "set" the register for the various denominations of coins is arranged so that it may also be used for the operation of the center doors. Thus, if the conductor should find it necessary to leave his station at the center door he can open the door for passengers without it being necessary for him to return to his station, the "throwing" of the valve being accomplished by simply twisting the register rod to the proper point. Necessarily, the passengers using the main passenger compartment, especially women passengers, will not pass through the smoking compartment to leave the car and as a consequence the center door is opened and closed rather frequently, making the arrangement by which it is not necessary for the conductor to return to his post in order to open or close the door a great time saver and convenience.

The construction of the side



CENTER-ENTRANCE CARS FOR PITTSBURGH. This illustration shows very clearly just how advantage is taken of every available inch of space throughout the car, giving it the large capacity of 69 seated passengers. The partition which divides the motorman off from the rest of the car is used as a means of supporting extra seats

framing of the car is such that the side sill forms the tension member of a plate girder, the belt rail forming the compression member and the side sheathing the web. This side sheathing is riveted to both side and window sills. The plate girder extends in one piece along both sides of the car to the body corner post, except at the center door openings, where the framing is such as to equal the strength of the plate girder. The plates are divided into sections so that they may be removed in case of collision for repairs and a 3-32 in. steel splice plate sufficiently wide to take two rows of rivets is provided at each post in order to permit the removal of plates without disturbing the post itself.

In the underframes the side sills are of 3 by 2½ in. angle extending from bumper to bumper. The end and cross sills are of pressed steel channel fastened to the side sills with angles and gusset plates. The center sills are of 4 in. channel and the bolsters are of the built-up type, formed of pressed steel shapes and constructed so as to permit the passage of air-brake piping and conduits. The bumpers are of channel iron, 23½ in. above the rail.

The cars are provided with double flooring made of maple, tongued and grooved and white leaded. The first layer of floor boards is laid lengthwise and the top layer crosswise of the car. Building felt is laid between the two floors. Safety precautions are taken by the installation of steel matting in the aisles of the car on the level portion and maple slats crosswise on the ramp portion and opposite the center doors.

The roofs of the cars are supported on steel carlines extending from side post to side post in one piece and bolted to each side post through the solid-forged foot at each end. Wooden carlines are bolted to these steel carlines. These wooden carlines are made from straight pieces bent to form.

The roofs are sheathed with poplar, screwed and nailed to the deck rafters. This poplar sheathing is covered with double-weave cotton duck.



CENTER-ENTRANCE CARS FOR PITTSBURGH. The conductor's stand is at the center door, just a few feet short of the partition shown in this illustration. However, he is not "anchored" to his station, it being possible for him to move about his car and to operate the center doors without returning to his station. These center doors are actuated by a rod run through the register rod hangers

Convertible Cars for Pottstown & Phoenixville Railway

BRILL 39-E AND 21-E TRUCKS

EIGHT convertible cars—six of them 27 ft. 9½ in. over the corner posts and mounted on Brill 39-E trucks and two of them 22 ft. 11½ in. over the corner posts, and designed for use on a Brill 21-E truck, recently were delivered from the plant of The J. G. Brill Company to the lines of the Pottstown and Phoenixville Railway, of Pottstown, Pa. This operation connects Pottstown (15,500) with Phoenixville (10,700), serving such smaller towns as Bramcote, Stowe, Sanatoga, Spring City, Linfield and Royersford. Three other lines —the Pottstown Passenger Railway, Pottstown and Reading Street Railway and the Montgomery and Chester Electric Railway — are leased by the company. Altogether a total of about 25 miles of track is operated.

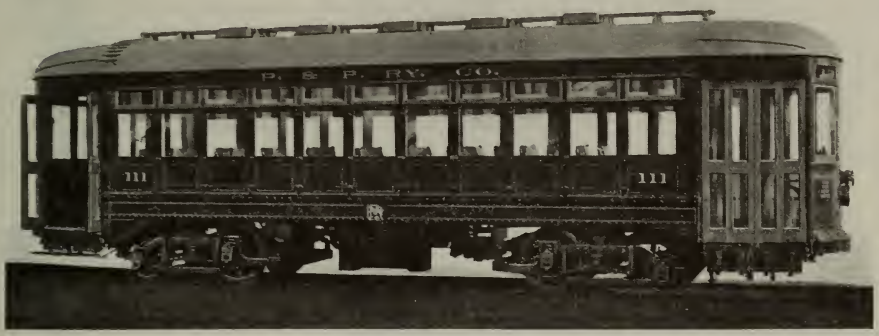
The underframes upon which each of the two types is mounted are of all-steel construction. In the smaller car the side sills are of 14 by 3-16 in. steel plate, reinforced with a beaded bar along the top edge and a 3 by 2 in. angle along the bottom edge.

Both types of car are built with Brill Plain Arch roofs strengthened with pressed steel, U-shaped rafters extending the full width of the roof between the top rails, one rafter located at each side post. The larger cars are built with eleven windows on each side and the smaller ones have nine on each side. The windows are built with double sash, the top sash arranged to raise and the bottom sash removable.

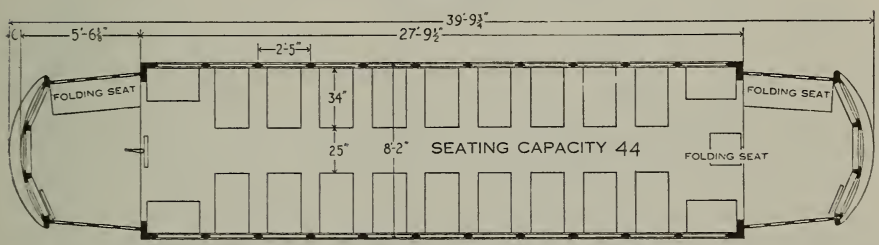


CONVERTIBLE CARS FOR POTTSTOWN & PHOENIXVILLE RAILWAY. The cars furnished the company are of two types —a 44-passenger double-truck car, mounted on Brill 39-E Trucks, and a 36-passenger single-truck car, mounted on a Brill 21-E Truck. There were six of the former and two of the latter in the order

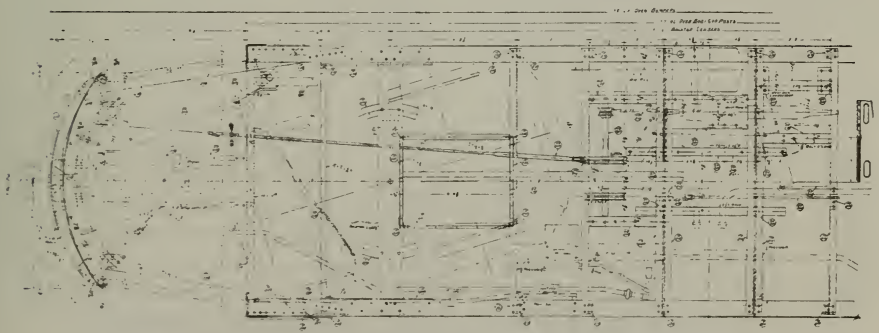
The larger car has a seating capacity of 44 persons and the small car has provision for 36 persons, both these totals being without the barrier seats. On each side of the barrier at the end sill there is a single folding seat.



CONVERTIBLE CARS FOR POTTSTOWN & PHOENIXVILLE RAILWAY. The single-truck car is shorter by two windows than the double-truck type. The top sash is arranged to raise and the lower sash is removable. The bottom edge of the top sash is provided with a steel shield which prevents rain from beating in when the top sash is down



CONVERTIBLE CARS FOR POTTSTOWN & PHOENIXVILLE RAILWAY. (Large car). Height from track to underside of side sills, 2 ft. 10⅛ in.; height from underside of side sills over trolley boards, 9 ft. 0½ in.; height from floor to center of headlining, 8 ft. 0¼ in.; track to step, 14⅛ in.; step to platform, 13½ in.; platform to floor, 10⅛ in.; weight of carbody, less electrical equipment, 18,800 lb.; weight of electrical equipment, 1100 lb.; weight of airbrake equipment, 1000 lb.; weight of trucks, 10,430 lb.; weight of motors, 4750 lb.; total weight, 36,080 lb.



CONVERTIBLE CARS FOR POTTSTOWN & PHOENIXVILLE RAILWAY. (Small car). Height from track to underside of side sills, 2 ft. 7 5/16 in.; height from underside of side sills over trolley boards, 9 ft. 1½ in.; height from floor to center of headlining, 8 ft. 0¼ in.; track to step, 13 13/16 in.; step to platform, 13½ in.; platform to floor, 9 5/16 in.; weight of carbody, less electrical equipment, 13,640 lb.; weight of airbrake equipment, 1000 lb.

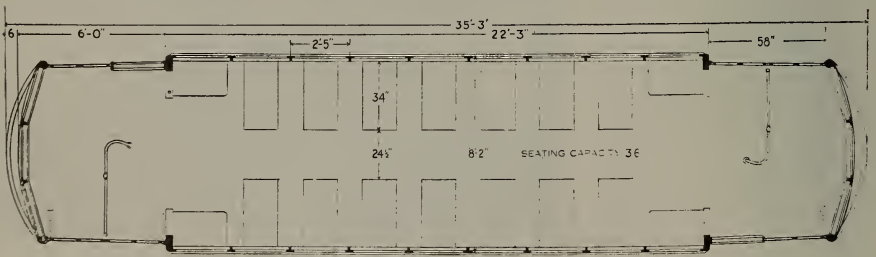


Fifteen Cars for San Antonio, Texas

BRILL "RADIAX" TRUCKS

FOR service in the city of San Antonio, Texas, whose population is about 120,000, the San Antonio Traction Company recently received from the American Car Company fifteen single-truck double-end motor cars, each mounted on a Brill "Radiax" Truck. The use of light-weight equipment on this operation is exceedingly interesting. By its use the company expects to reduce the minimum headway from fifteen to ten minutes on all its lines without increasing the cost of operation over that of the old, heavy equipment of the company. The old cars will be retained for peak service and for the heavier lines. Through the use of the "Radiax" Truck the new cars have been given a seating capacity almost as great as that of the old cars, but the new equipment weighs only half that of the replaced cars.

The company has had an extensive—and interesting—experience with light-weight cars and with one-man equipment. It has been the experience of the com-



FIFTEEN CARS FOR SAN ANTONIO, TEXAS. Height from track to underside of side sills, 26 1/16 in.; height from underside of side sills over trolley boards, 8 ft. 5 in.; height from floor to center of headlining, 7 ft. 8¾ in.; track to step. 12 1/16 in.; step to platform, 12¾ in.; platform to floor, 7 in.; weight of carbody, 8100 lb.; weight of trucks less wheels and gears, 4000 lb.

pany that, aside from the question of power consumption—which hangs entirely upon the matter of weight—the chief advantage of one-man operation lies in the reduction in wage costs. With the San Antonio operation the platform costs were not halved, due to the fact that the company deemed it advisable to allow two cents per hour extra for the operation of one-man cars and that in one case nine one-man cars were operated where eight two-men cars would have held up the same schedule. Additional layover time was found to be necessary—to the extent of about five minutes per round-trip. The more frequent service made possible by the use of the light-weight cars has been found to be of inestimable value to the company, in that it has shown a strong tendency to increase patronage. In discussing the single-truck car in general, W. B. Tuttle, Vice-President of the company, says:



Fifteen Cars for San Antonio, Texas. The cars have two doors on the rear platform—an entrance and an exit—and a single door on the front platform. They are sheathed with steel. The doors and steps are operated in unison. The roof is of the Brill Plain Arch type

"The later designs of single-truck cars have extended the usefulness of the single-truck car to cover part of the field which formerly only a double-truck car would handle successfully. If the density of passenger traffic and the street and track capacity permit the use of smaller cars, the single-truck car should be used, as it effects economies which cannot be neglected. The old question of riding quality has been made almost negligible by the long wheel-base, single-truck car."

The cars are built with a double door—entrance and exit—on the rear platform and with a single exit opening on the front platform. Each of these openings is enclosed with a two-leaf folding door. At the rear the courses of incoming and outgoing passengers are separated by a railing. The doors and steps, as is standard construction on prepayment cars, are operated in unison. This arrangement of dividing the opening on the rear platform between entrance and exit has been used with great success on a number of lines. It furnishes a handy means of egress for those passengers who travel but a short distance and do not care to force their way through the aisle up to the front exit.

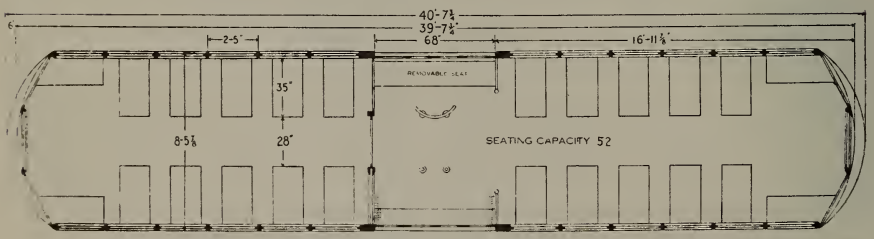
Center-Entrance Cars for San Francisco-Oakland Terminal Railways

BRILL 77-E TRUCKS; RENITENT POST SYSTEM

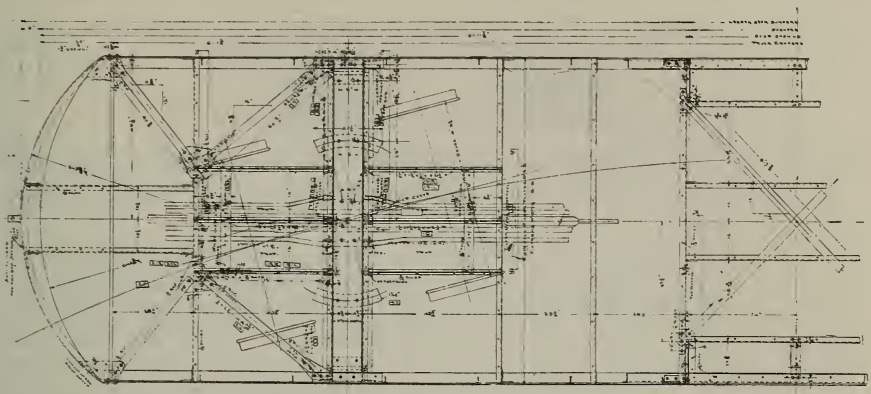
THE American Car Company recently completed for the San Francisco-Oakland Terminal Railways twenty center-entrance, city cars mounted on Brill 77-E trucks. A good idea of the service for which these cars were purchased may be had by reference to an article on "Conditions Which Govern the Type of Car for City Service—Oakland, Cal.," appearing in BRILL MAGAZINE for May, 1913. This article outlines the operation of the company and should prove of interest in connection with consideration of the type of car selected for the operation, which type is illustrated herewith. Still another article dealing with the traffic situation of the city of Oakland—and the operation of the San Francisco-Oakland Terminal Rys.—may be found by referring to the July, 1916, issue of BRILL MAGAZINE. This latter article, although it deals with the inter-



CENTER-ENTRANCE CARS FOR SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS. The cars are of particular interest because of their being mounted on the Brill 77-E (two-motor) Trucks with 24-in. wheels. This use of small-diameter wheels makes access to the car easy, by means of two rises, 14½ and 11¾ in. respectively. A large number of operators are turning their attention to this subject of small-wheel, low-level cars



CENTER-ENTRANCE CARS FOR SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS Height from track to underside of side sills, 23 in.; height from underside of side sills over trolley boards, 9 ft. 3⅞ in.; height from floor to center of headlining, 8 ft. 4⅜ in.; track to step, 14½ in.; step to platform, 11¾ in.; weight of carbody, 17,500 lb.; weight of trucks, less gears, 4844 lb. each



CENTER-ENTRANCE CARS FOR SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS. The cars are built on steel underframes. The bolsters are of the built-up type with 9-in. plates. The side sills are of angle, reinforced where they are dropped to take care of the center entrance. The crossings are of channel, those at the center being larger than those nearer the ends. The bumpers are of still larger channel. Diagonal bracing is used in the center and end panels

urban situation in Oakland, helps give a comprehensive idea of the relation of the city to the railway and their interdependability.

In addition to the twenty city cars shown herewith, the American Car Company has in course of construction twelve other cars for the Key System, which cars will be made the subject of an article in a later issue.

The cars have two compartments with a center-entrance platform dividing the compartments. One of these compartments has a full bulkhead partition adjoining the center entrance and the other is open, divided off by stanchions and railings. There are six windows in each compartment, the upper sash stationary and the lower sash arranged to raise. These windows are built with Brill Renitent Posts, a newly-perfected standard of Brill construction, which is creating a great deal of interest in the field.



CENTER-ENTRANCE CARS FOR SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS. The use of the Brill Renitent Post is an outstanding feature of the car. This post is water-tight, rattle-proof, safe against sudden dropping, easily removable without the use of tools, cannot be racked or broken by careless handling and makes the post easily accessible for inspection or to make repairs in case of collision

"Near-side" Cars for Buffalo

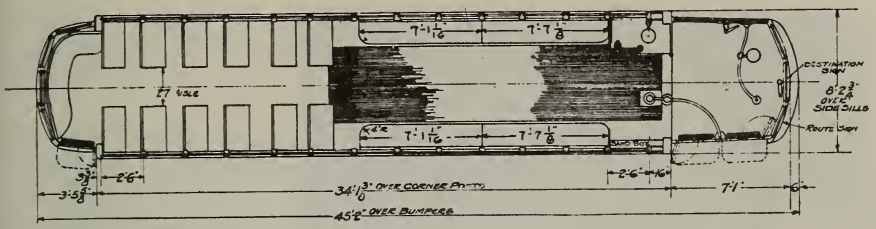
SEMI-CONVERTIBLE WINDOW SYSTEM

THE G. C. Kuhlman Car Company, of Cleveland, Ohio, recently shipped to the International Railway Company, of Buffalo, N. Y., seven "Near-side" cars, duplicates of the cars which for some time have been used by the Philadelphia Rapid Transit Co. and the Chicago City Railway Co. A good idea of the operating conditions existing in Buffalo—conditions which are being met by this "Near-side" type of car—may be had by reference to BRILL MAGAZINE for January, 1913, and for November, 1915. The former contains an article describing the city service of Buffalo and the latter an article on the interurban system of the city. Although the cars illustrated herewith are of a typical city type, this latter article helps give a comprehensive idea of the part the company's lines play in the general ensemble of the city's traffic system.

Until 1911 the International Railway used several types of both single and double-truck cars. The standard car up to that time was, however, a large prepayment type built by the Kuhlman Company and mounted on Brill 27-F trucks. In 1911 an order for 35 "Near-side" cars was placed with The Brill Company and one month later 26 cars of the same type were ordered. These two lots of cars were put into service on different lines and a thorough testing-out was given them, comparisons being made of the results obtained on the two lines. Remarkable records were made, their efficiency in loading and unloading being established as being 20 per cent. higher than



"NEAR-SIDE" CARS FOR BUFFALO. The success scored by this type of car in Buffalo, Philadelphia and Chicago has been remarkable. The type was adopted as standard in Buffalo after a very extensive and satisfactory trial. The design of the car is the result of collaboration on the part of prominent car-design and heating and ventilation experts. Shortly after its debut in Philadelphia it was pronounced by prominent physicians as being of a very high degree of efficiency, as far as sanitation is concerned



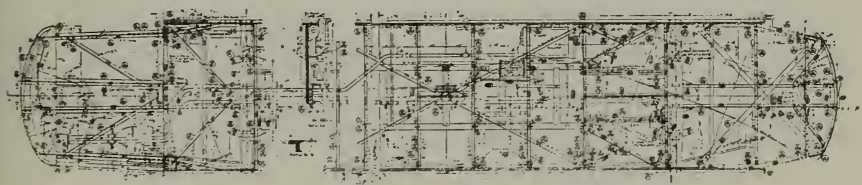
"NEAR-SIDE" CARS FOR BUFFALO. Height from track to underside of side sills, 2 ft. 6¾ in.; height from track to bolster, 2 ft. 3⅛ in.; height from track over roof, 11 ft. 7⅜ in.; weight of carbody complete with accessories, 17,833 lb.; weight of truck, 9920 lb.; weight of motors, 4800 lb.; weight of airbrake equipment, 1200 lb.; weight of body electrical equipment, 1200 lb.; total weight, 34,953 lb.

the records shown by the old cars. Likewise, the increased safety, due to the loading and unloading being under the eye of one man, early was recognized.

This success of the car under its service tests led the company to adopt the type as its standard city car and the placing of orders for larger numbers of cars quickly followed. The perfection of the "Near-side" type of car is one of the most interesting features of the development of modern car construction. The car was developed under the personal supervision of the Health Commissioners of Chicago and Buffalo, both of whom played an important part in the selection of the proper heating and ventilating system. Early in the Philadelphia history of the car it was acclaimed by prominent physicians as a most excellently arranged car, viewed from the standpoint of health.

The cars are built upon all-steel underframes. The side sills are made up of 5/16 in. plate tapered from a width of 18 inches at the highest point (the width of the three center window posts) to a width of 8 inches. These plates are reinforced at the top and at the bottom with light angles. They are also reinforced vertically at intervals. At the front end of the frame an upper truss is used to prevent deflection of the overhang of the main frame. The crossings are of angle trussed with diagonal cross members. Cast steel bolsters are used, the ends lipped down under the side sills. The posts are set into a pine sill which is bolted to the lower angle of the sill plate.

Brill Semi-convertible windows



"NEAR-SIDE" CARS FOR BUFFALO. The side sills are of steel plate, 18 in. wide for the space of three center windows and tapering down toward the ends. These side-sill plates are reinforced top and bottom and vertically at intervals by light angles. Angle crossings. with diagonal braces, are used. The bolsters are of cast steel



"Near-side" Cars for Buffalo. The design is a decided improvement over the type of car previously used by the company. The location of both conductor and motorman on the front platform makes for safety and efficiency in loading and unloading. The doors are under the direct observation of the motorman, who has to see that his steps are clear and his door closed before he starts his car. Also, there is no chance of misunderstanding signals

and a roof of the Brill Plain Arch Type are used in the car. The roof is supported on concealed carlines. The advantages of the Semi-convertible window system are as well-known as they are numerous. In brief, cars equipped with this system are adaptable to both summer and winter service, the sashes raising into sash pockets concealed in the roof of the car. Thus, the car itself furnishes storage space for its own sashes, and besides, they are available at a moment's notice to make the car absolutely water-tight. The sash pockets being in the roof of the car, there is no chance for refuse, papers and other scraps to be thrown into the pocket, wedging itself in tightly and causing the smashing of the glass when the window is raised. The elimination of the unsanitary feature of this refuse-collecting lower pocket is another very considerable item.

The front platform of the "Near-side" car is used for loading and unloading, the smaller door at the rear being used as an emergency exit. This small door is used also at terminals to facilitate the unloading of the car. The fares are collected by the conductor, standing just inside the carbody. Location of both motorman and conductor on one platform is of great advantage in making the operation safe. Upon the motorman is placed the entire responsibility of seeing to the safe starting and stopping of the car. As soon as his steps are entirely clear and his door closed he starts his car, without waiting for a signal from his conductor. Thus, there is no chance of a misunderstanding between the members of the car's crew. Further, the attention of the conductor is not needed upon the operation of the doors and he is free to collect his fares, a fact which indicates the advantage of the car in increasing efficiency in fare collection. The time the conductor formerly took for the operation of his door he devotes on the "Nearside" car to the proper calling of streets, issuing of transfers and the registration of fares.

Semi-Convertible Cars for Asheville, North Carolina

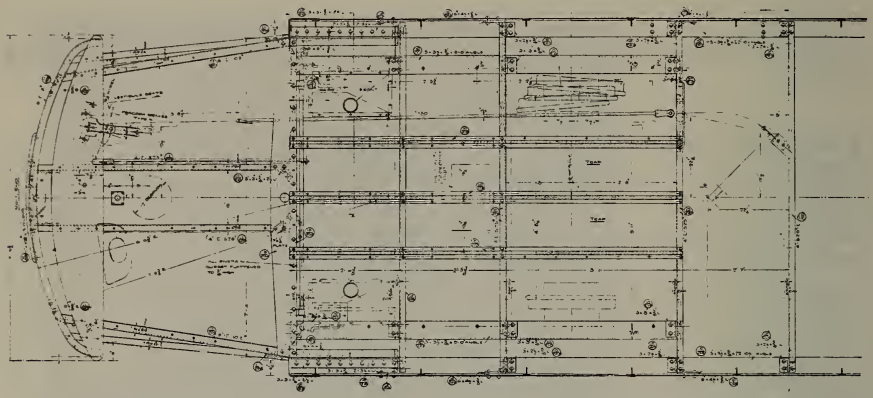
BRILL "RADIAX" TRUCKS

SIX 23 ft. Semi-convertible pre-payment motor cars, each mounted on a Brill "Radiax" Truck, recently were completed for the Asheville Power & Light Company by The J. G. Brill Company. The new cars are to replace old equipment. Asheville presents a very interesting single-truck car situation. The population totals 30,000, the summer months, however, bringing this total up to a much higher pitch, due to the large amount of excursion riding that is done during those months. The city really has several tourist seasons. The spring season at Asheville attracts many tourists en route from Florida to their homes in the north. The summer season extends from June well into October, and during this season the city is the mecca of people from more southern points, who leave the lowlands and the heat for the mountains. Then, too, there is the regular fall and winter season. Thus it is seen that Asheville proves itself attractive to tourists during every season of the year. Each set of tourists, of course, means added revenue to the local transportation company.

The company operates twenty-one miles of track, stub-end operation. At the terminal of one of the lines the company has an amusement park, called Riverside Park, where, during the summer, band concerts, etc., are held. The roadbed in the main is laid on paved streets with single track and several long sidings. Out in the suburbs there is a stretch of ballasted track about three miles long. All the cars of the company meet at a public square in the center of the city, the lines



SEMI-CONVERTIBLE CARS FOR ASHEVILLE, N.C. The use of this "Radiax" Truck car in Asheville is but one instance out of many in which electric railway companies have found the use of a light-weight car, ordinarily of too great a capacity for a single truck, entirely practicable with the Brill "Radiax." The car's capacity of 40 passengers compares very favorably with the capacity of the average double-truck car. This capacity includes the folding seats

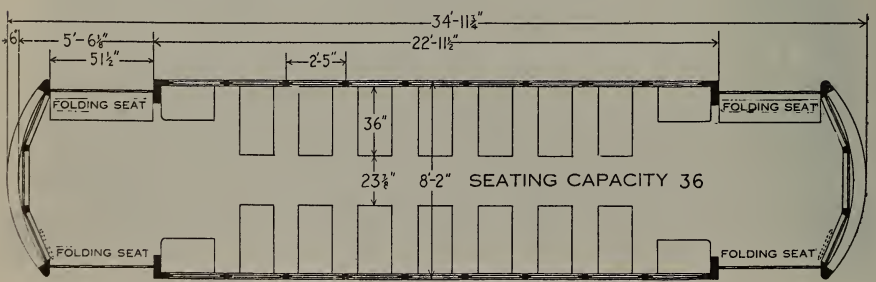


SEMI-CONVERTIBLE CARS FOR ASHEVILLE, N.C. The side sills are of plate reinforced with a bar along the top edge and an angle along the bottom edge. The end sills are of channel, as are also the crossings

radiating out from this focal point being about 2½ miles in length. The company is able to make its schedules at an average speed of eight miles an hour and with an average of twenty stops per mile.

The company is under contract for its power with a hydro-electric plant operated by the North Carolina Electrical Power Company. In addition, the company has a steam station in the city limits which may be used as auxiliary. One of the lines of the company crosses the French Broad River and runs about two miles into the town of West Asheville. The fare rate is six for twenty-five cents, with privilege of transferring at the square with any connecting line. An idea of the business done by the company may be had from a reference to the traffic statistics for the year 1915. During this year the company carried a total of 5,147,685 passengers with a total car mileage of 948,383.

The town of Biltmore, near Asheville, is most interesting. Here is located the model village built by the late George W. Vanderbilt contiguous to his estate of



SEMI-CONVERTIBLE CARS FOR ASHEVILLE, N.C. Height from track to underside of side sills, 22⅝ in.; height from underside of side sills over trolley boards, 9 ft. 5⅝ in.; height from floor to center of headlining, 7 ft. 9 in.; track to step, 14½ in.; step to platform, 13¼ in.; weight of truck, 6115 lb.; weight of motors, less gears, 3190 lb.

about 130,000 acres. A portion of this estate now is the property of the United States Government, being part of the Southern Forest Reservation.

The cars are built upon all-steel underframes. The side sills are of 14 by 3/16 in. plate with a bar along the top edge and a 3 by 2 in. angle along the bottom edge. The end sills are of 10 in. channel and the crossings of 3 in. channel, the wheelpieces of 5 by 3½ in. angle. The bumpers are of angles.

The body framing is of the standard Brill Semi-convertible construction. The corner posts are of angle iron and the side posts of tees, the tees continuous and forming the carlines for the roof. The body sheathing is of sheet steel, as are also the letter boards. As is standard Semi-convertible practice the windows are provided with hinged double sashes, which are arranged so as to raise readily into the roof pockets. There are nine windows on each side of the car, the window heads built straight.

Brill "Winner" seats were specified for the cars. There are seven reversible seats on each side of the car and a longitudinal seat at each end extending the space of one window. The seats and backs are upholstered with rattan over springs. The seven transverse and two longitudinal seats on each side of the car would give the car a total seating capacity of 36. However, this is augmented by the installation of a folding seat on both sides of each platform, extending across the door opening.

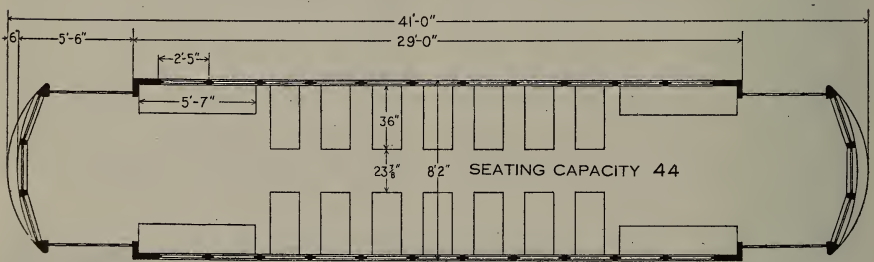
The use of the Brill "Radiax" Truck under this car is of particular interest. This is but one instance out of a vast number where the "Radiax" has come to the rescue of the operation for which single-truck cars did not seem practicable because prevailing conditions made necessary the use of a larger car than could be mounted on the ordinary single truck. Many such operations now are taking advantage of the economical single-truck operation by using the Brill "Radiax."



Semi-Convertible Cars for Asheville, N. C. Asheville's situation is a peculiar—and profitable—one, the city being both a winter and a summer resort. People from the north make it popular as a winter resort, and people from the south flock to it in summer, to escape the heat of the lowlands. Necessarily, this means a good volume of business for the company offering transportation facilities



SEMI-CONVERTIBLE CARS FOR WILMINGTON & PHILADELPHIA TRACTION. These cars have been put in service in Wilmington, Delaware, on some lines that were not covered by the previous order for new cars. These previously built cars were described in an article appearing in BRILL MAGAZINE for May, 1916

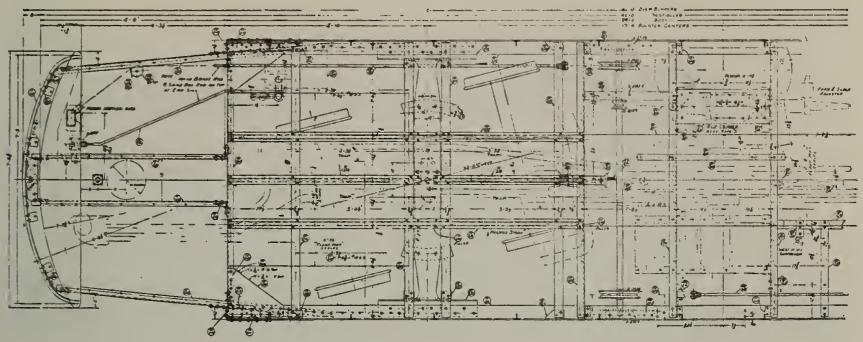


SEMI-CONVERTIBLE CARS FOR WILMINGTON & PHILADELPHIA TRACTION. Height from track to underside of side sills, 2 ft. 1$\frac{13}{16}$ in.; height from underside of side sills over trolley boards, 9 ft. 1⅞ in.; height from floor to center of headlining at end sill, 7 ft. 11¾ in.; track to step, 15 in.; step to platform, 13½ in.; 1½-in. ramp; weight of carbody, less electrical equipment, 18,060 lb.; weight of electrical equipment on body, 1680 lb.; weight of airbrake equipment, 1200 lb.; weight of trucks, 8400 lb.; weight of motors, 6400 lb.; total weight, 35,740 lb.

Semi-Convertible Cars for Wilmington & Philadelphia Traction

BRILL 53-F TRUCKS

THREE 29 ft. Semi-convertible cars mounted on Brill 53-F trucks have been completed at the plant of The J. G. Brill Company and delivered to the Wilmington & Philadelphia Traction Company. At present they are in service in Wilmington, Delaware, being operated on lines which were not covered by the last lot of new equipment purchased by the company. This last equipment consisted of thirty-one Semi-convertible, low-level cars, which were divided between the Wilmington and the Chester divisions of the company. These low-level cars were described in an article pub-



SEMI-CONVERTIBLE CARS FOR WILMINGTON & PHILADELPHIA TRACTION. The underframes are all-steel, the side sills of angle, reinforced at the bolsters, which are of cast steel. The platform knees and end sills are of channel

lished in the May, 1916, issue of BRILL MAGAZINE, and reference to that article will provide a comprehensive idea of the character of the service for which they were purchased.

The cars illustrated herewith are of a type which is very similar to the type of car described in the article mentioned. In fact, the chief point of difference seems to be in the platforms. In the previous order the platforms were swung lower to the ground than is the case in this second order. The cars described in the May, 1916, issue were built so that the platform was but 15 in. above the track, the rise between the platform and the carfloor being 13½ in. In this new order the platform floor is a continuation of the carfloor and is reached by two easy steps of 15 and 14 inches.

The cars are built upon steel underframes in which the side sills are of 5 by 3½ in. angle, the long leg laid horizontal. At the bolster this side sill is reinforced with another angle of the same dimensions. The crossings are of pressed steel riveted to the side sills. The bolsters are of cast steel.



SEMI-CONVERTIBLE CARS FOR WILMINGTON & PHILADELPHIA TRACTION. The last lot of cars were of a type in which the platforms were built closer to the ground; whereas in the cars illustrated herewith the platforms are level with the floor of the car and are reached by two rises from the ground

Semi-Convertible Cars for Jersey Central Traction Company

BRILL "RADIAX" TRUCKS

THE J. G. BRILL COMPANY recently delivered to the Jersey Central Traction Company, of Keyport, N. J., three 22 ft. 5 in. Semi-convertible cars each mounted on a Brill "Radiax" Truck. These cars were purchased by the company for use on its branch lines between Keyport and Matawan, between Matawan and Freneau, and between Perth Amboy and Mauer. These lines are comparatively short, being under one five-cent fare zone and on each of them the traffic is light. The use of a car of this type for this sort of service is of peculiar interest. The cars were ordered to replace a heavy interurban type, thereby effecting a very appreciable reduction in the cost of operation. With the exception of these new cars practically all of the company's present equipment is of the heavy, four-motor interurban type. The economy of these new cars is obvious.

The cars are typical Prepayment, steel-sheathed Semi-convertible cars, each mounted on a Brill "Radiax" Truck, and built on all-steel underframes. The cars are provided with transverse and longitudinal seats arranged to give a seating capacity of thirty-two passengers. Brill Plain Arch Roofs are used in the construction of the car. The body framing is a combination of wood and steel. Brill "Winner" seats, upholstered in rattan, were specified for the car.

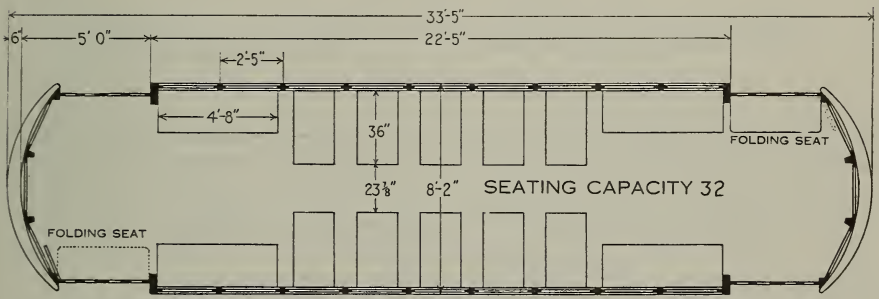


Semi-Convertible Cars for Jersey Central Traction Company. The use of this car is of particular interest, the single-truck type having been ordered as a replacement of heavy double-truck equipment formerly used by the company. The towns which will be connected by the service rendered by these cars are, however, fairly close together

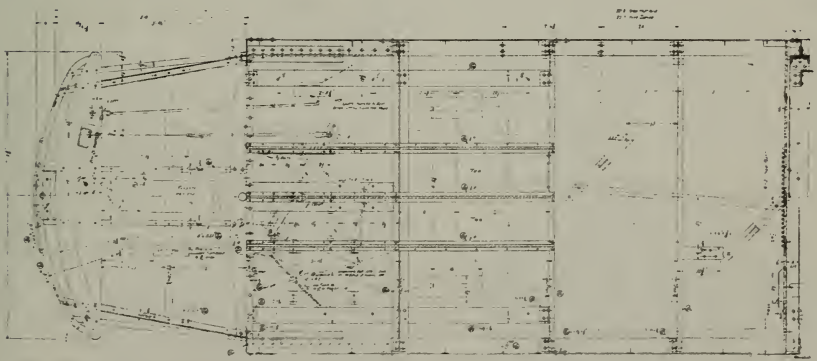
The line of the company skirts the shore of Raritan Bay for almost its entire length and to a very large extent depends upon the tourists to and from the resorts along the bay. Dur- the summer the company finds itself taxed to handle the traffic.



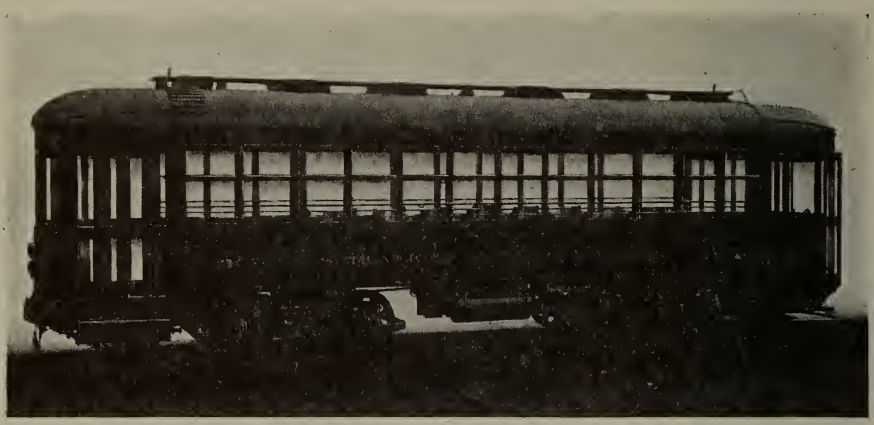
SEMI-CONVERTIBLE CARS FOR JERSEY CENTRAL TRACTION COMPANY. The company operates forty-one miles of track, of which only one and one-half miles are double tracked. During the last year 963,000 miles were operated, with a total of 5,125,214 passengers carried



SEMI-CONVERTIBLE CARS FOR JERSEY CENTRAL TRACTION COMPANY. Height from track to underside of side sills, 23⅜ in.; height from underside of side sills over trolley boards, 9 ft. 1⅞ in.; height from floor to center of headlining, 7 ft. 9 in.; track to step, 15 in.; step to floor, 13¾ in.; weight of carbody, less electrical and airbrake equipment, 12,300 lb.; weight of electrical equipment on body, 900 lb.; weight of airbrake equipment, 910 lb.; weight of trucks and gears, 6670 lb.; weight of motors, 3500 lb.; total weight, 24,280 lb.



SEMI-CONVERTIBLE CARS FOR JERSEY CENTRAL TRACTION COMPANY. The side sills are of angle and the end sills and crossings are of channel. The trap-door supports are of tees, and both outside and center platform knees are of channel. The wheel-pieces are of channel



New Cars for Schuylkill Railway Company

BRILL 77-E AND "RADIAX" TRUCKS

FOUR 41-ft. prepayment vestibule motor cars, exact duplicates of a previous order built for the same company and two 36-ft. cars of the same type recently were completed by The J. G. Brill Company for the Schuylkill Railway Company, of Girardville, Pa. The smaller cars are mounted each on a Brill "Radiax" Truck, Brill 77-E Trucks being used under the larger cars. These latter were described in an article appearing in BRILL MAGAZINE for January, 1916, which article incorporated an illustration showing the arrangement of the interior, the seating arrangement and the formation of the underframe.

The cars mounted on the "Radiax" trucks are two windows shorter than the other cars, but in other details are duplicates of the larger cars. All of the cars are built on steel underframes. The side sills are of 5 by 3½ in. angle, the long leg laid horizontal and this member is reinforced with a 6 by 3½ in. angle to relieve the strain on the horizontal leg. The bolsters are of cast steel, made with proper openings.

The outside platform knees are 7 by 3½ in. angle reinforced with a 2 by 2 in. angle iron under the end sill. The center platform knees are of 4 in. channel extending from the end sill to the bumper channel.

The seats are of the Brill "Winner" type. The larger car has eight transverse seats on each side of the car and a longitudinal seat covering the space of two windows at each corner of the car. This arrangement gives the car a capacity of 44 seated passengers. The arrangement is the same in the shorter car except that there are but six transverse seats on each side instead of eight. This makes a capacity of 36 seated passengers.

SUGGESTIVE SUBJECTS

Note.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

WHAT BRILL RAILWAY PUBLICITY SERVICE MEANS TO YOU

FIRMLY convinced of the efficacy of publicity in dealing with the knotty situations which frequently face the electric railway manager and feeling that we are able to handle the work of still more companies than already are making use of our services, we are once more calling to the attention of the field in general the details of the Brill Railway Publicity Service. This Service was inaugurated for the sole purpose of furnishing to managers of the railway field data and statistics collected through years of close contact with the railway field and rendering special assistance in the way of preparing "copy" for advertising campaigns, helping (through the furnishing of material and suggestions) with the publication of employes' magazines and other literature put out by the companies, and in short serving as a special, though long-distance, publicity man, at the beck and call of the railway manager—and without charge.

We are not wholly unselfish in making this offer because we feel that anything that works for the good of the railway field redounds to our own advantage sooner or later—always in a general way, however, because we have it definitely understood that there is not only no charge connected with the Service, but there is no obligation assumed by anyone making use of it, whether a Brill customer or not. Several specific cases bear us out in the general statement that to make use of our service would react to your advantage. In all of the instances where managers have made use of the Service we have had the satisfaction of knowing that the work we have done has hit the mark—and hit it forcefully.

In one city a jitney problem was tackled with a series of jitney competition advertisement and within an astonishingly short time results that were almost amazing showed their heads. In another case the company decided upon the expenditure of an appropriation for advertising of a general, "good-will" character. We had the pleasure of cooperating in the preparation of this campaign and the report received on the results obtained is more than edifying. In still another case a publicity agent requested certain information which was easy of access for us, due to the extensive correspondence we have carried on with the field in general in connection with the preparation of articles for BRILL MAGAZINE. We were able to send him the data requested practically overnight and he on his part was enabled to make immediate use of it to good advantage.

And so on through the list the requests have been widely varying in nature, all of which is an indication of the nature of the Service and its possibilities of being of valuable service to you. If there is the slightest thing in which you think we might be able to help do not hesitate to dictate us a letter, telling us the details of the difficulty to be overcome. Our services are absolutely free and without a string attached. Write in to us and put us to work on your publicity situation. Address the Publicity Department, The J. G. Brill Company, Philadelphia, Pa.

THE CONDUCTOR'S CHIN

NO—this is not a discourse on the gentle little gift of gab and how it works to the very great disadvantage of the company, represented in a false light by the chap with the gab. On the contrary, there is no slang intended. We want to talk about chins as constructed

of flesh and blood and skin—and whiskers. The very first thing the eye of a patron of a trolley lights upon as he or she mounts to the platform is the chin of the conductor. What if that chin is stubbly and grimy? What is the impression gained by that passenger of the company employing that chin? Certainly not a very clean one. Some chins by nature are inclined to be more stubbly than others; some in fact are blue with beard. However, the art of shaving is by no means a dead one or one that is hard to acquire and with razors well within the price of the platform man it seems mighty easy for him to get the habit of taking a shave along with his nightly—or morning—chores about the house. It's a habit that, once formed, is hard to break, it's such a good one.

WILL YOU CLASSIFY YOURSELF?

PLATFORM men — conductors and motormen — well may be divided into three classes. In the first place there is the man who, whether it be because he is lacking in ambition or is distrustful of the world in general and fails to see the slightest trace of a silver lining anywhere, regards his work as a mean "job," a deadly thing at which he must stick all his life. He is lazy—physically as well as mentally—discouraged and a grouch in general. Then, there is the man who occasionally, by reason of faint traces of common sense, sees in the men who have started lower down life's ladder than he and who are rapidly and steadily mounting an indication of a future before him. But he, too, is lacking in the backbone necessary to lift himself above his position and so he sticks where he is, bewailing the fate which does not steal up behind him in the dark and pick him up and deposit him gently on a bed of roses. He is even more to be censured than the first man because he cannot blame his failure to be "up and doing" on ignorance of the possibilities before him. Then there is the third man, the chap who continually smiles as he goes about his duties, ever confident of the future before him and of his ability to attain success. This latter chap does not wait for some kind guardian angel to chance along and give him his needed boost up the ladder of life. Rather he is out for business at every moment, eager to push ahead, hurdling obstacles instead of weakly subsiding after collisions with them and rubbing his bruises. He it is who early changes from a "job" to a "position," who climbs surely and steadily and in whom his company early recognizes great ability. To which class—now, honestly—do you belong?

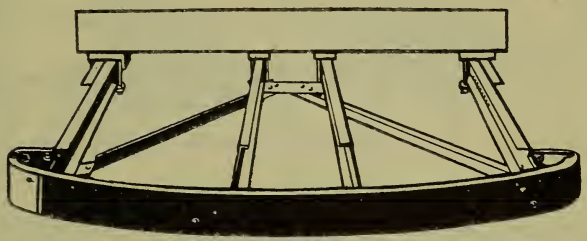
PUNCH

NO more descriptive word is there in the English language than "Punch," first cousin to that king of three-letterers, "Pep." And there is no more desirable characteristic than "Punch." It is the "juice" behind the motors of life. Some call it "enthusiasm," but "enthusiasm" sounds just a little mild in comparison. No, "Punch" is the word and "Punch" is the thing. The man with real punch is the one who arrives—gets there. Just how is all this applicable in your case, do you ask, Mr. Platform Man? Well, speaking broadly, it is the man with the "pep" who shoots up beyond his platform job, it is the man who puts punch into his work whom you see being planked down in the swivel-chair, executive positions. He's the man who has the pep for each hour of his daily trick and for each minute of each hour. Take a look up above you at the men who started where you are now and then—go after them.

CHANGES OF ADDRESS

THOSE who receive "Brill Magazine" are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.

ANGLE-IRON BUMPER



BRILL Angle-iron Bumpers are made in shapes and sizes suitable to all styles of cars. The bumper is bolted to the ends of the platform timbers, which are extended about ten inches for that special purpose. Thus it is seen that the method of attachment is simple but powerful, being removable simply through taking out four bolts. Its shape being so simple, the bumper is easily reshaped and replaced. The protection afforded the car by this bumper is more than "worth-while."

THE J. G. BRILL COMPANY

Main Office

PHILADELPHIA, U. S. A.

Cable Address: "Brill," Philadelphia

London Office

110 CANNON ST., E. C.

Cable Address: "Axles," London

AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS

Cable Address: "Bogibril," Paris

Agencies

AUSTRALASIA—Noyes Brothers, Melbourne, Sidney, Dunedin, Brisbane, Perth

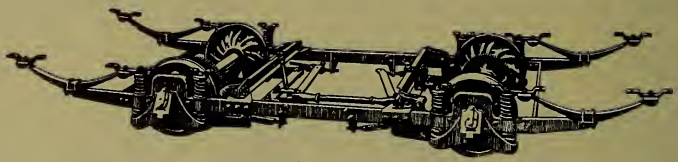
ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158, Buenos Aires

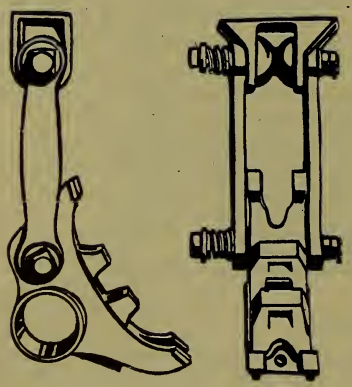
NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

LIGHT-WEIGHT 21-E TRUCK



FITTING in, in hand-in-glove fashion, with the ever-increasing demand for light-weight, economical equipment comes the Brill Light-weight 21-E Truck, exactly the same in design as the long-recognized regular 21-E, but lighter in weight by about 1800 lb. The truck has a wheelbase of 8 ft. and wheels of 24-in. diameter. The use of these small wheels makes the wheelbase 6 in. longer than would be the case were 33-in. wheels used. The brake rigging is arranged inside the wheels, thus effecting a substantial decrease in weight

THE BRILL "HALF-BALL" BRAKE HANGER

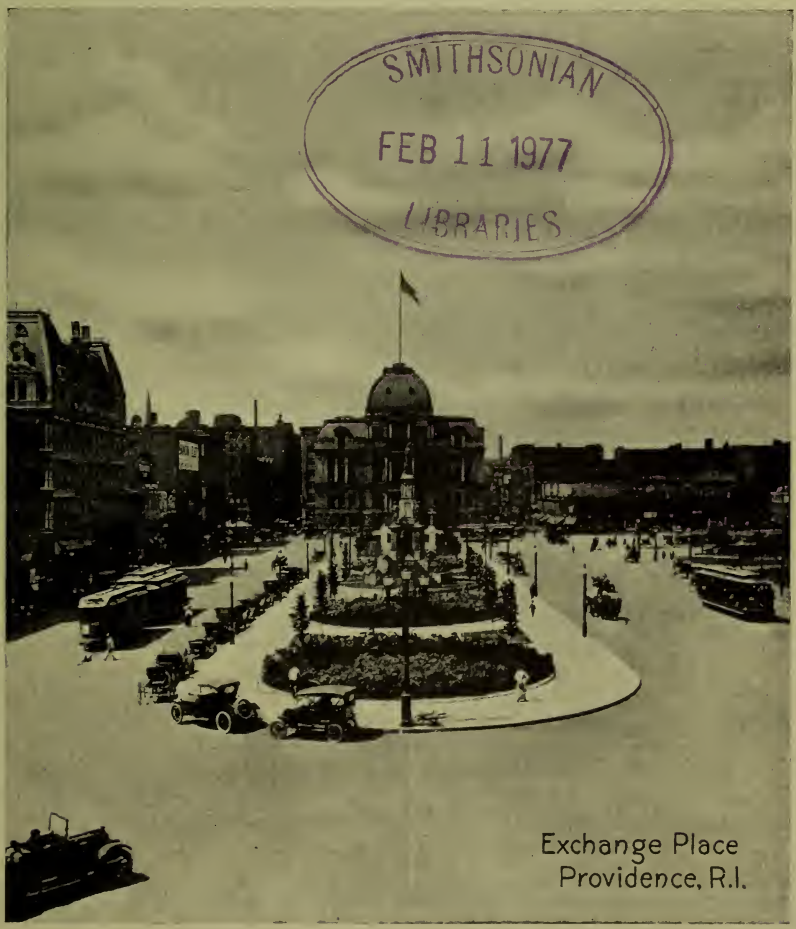


THIS brake hanger takes the jolt and rattle out of braking, giving the passenger a comfortable riding quality. The Brill hanger holds the shoes in proper alignment and, being self-adjusting for wear, is quiet and does not set up the fiendish vibrations which are so detrimental and so prone to create public disfavor.

VOL. II APRIL, 1917 NO. 4

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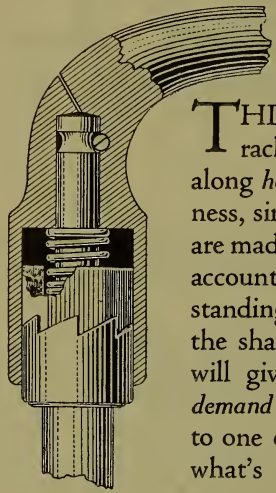
BRILL MAGAZINE



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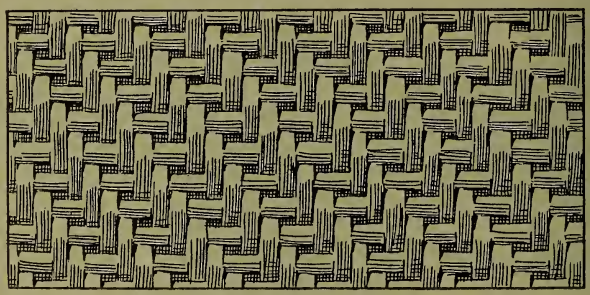
Exchange Place
Providence, R.I.

BRILL RATCHET BRAKE HANDLE



THIS is a handle that stands up under the racket year in and year out—a handle built along *honest* lines for *honest* service. The ruggedness, simplicity and strength of the parts, which are made in our own foundry, by our own experts, account for the success the handle has enjoyed in standing up against the hardest sort of tests and the sharpest kind of competition. This handle will give you service of the kind you should *demand* from a brake handle. Give a Brill handle to one of your motormen and let him tell you what's what. That's all we ask.

TWILL-WOVEN RATTAN



ONE of the very best ways to create disfavor on the part of your public is to allow your equipment to assume a moth-eaten appearance. Seats and seat-backs that present a worn, shabby, dirty aspect are very sure to act against your company. Give your passengers clean-looking seats and results immediately will be apparent in the shape of increased patronage. Brill Twill-woven Rattan comes in all widths and is made to give SERVICE



I. Kadama

Chief Engineer, Electric Bureau of Tokyo Municipal Office

THE BIG MAN

Have you ever known a BIG *man with a load? No! The big man makes it his business to load—the guns that do his execution for him. The really big man does not feel his tasks; he knows no such thing as a load under which he needs must groan and whine and whimper—that's the little chap. The test of the really big man comes when he reaches the point where he is ready to retire. If he is able to look back over his work and feel that instead of "getting out from under" a big load he has* LOADED *the work to go on as before, then he is a* MAN, *a* SUCCESS.

Have you EVER *seen a man rise to such a height as to be absolutely "out from under" his load? Have you ever heard of a man who was able to get beyond the point of service? Everyone has some definite point of contact with some other thing or group of things which he must serve. And what is service after all but obedience in the broadest sense? To escape service—duty—would be to avoid action—and action is the keynote of a big man's success. Ability to know his duties thoroughly has been the secret of the success of every truly big man.*

The big man is as far from imitation—and plagiarism—as night is from day. He has to be, for imitation and initiative cannot mix, and initiative is individuality. And in the final size-up of a man, to be individual is to stand out from the pack, the unsoliciting recipient of recognition.

BRILL MAGAZINE

VOL. 11—NO. 4 Copyright, 1917, by The J. G. Brill Company, Philadelphia, U. S. A. APRIL 15, 1917

HAYATSUCHI KODAMA

HAYATSUCHI KODAMA, Chief Engineer of the Electric Bureau of Tokyo Municipal Office, was born in 1863. He graduated from the Tokyo Imperial University in 1887 and entered the service of the Tokyo Electric Light Company and became the Chief Engineer of that company in the same year. He was appointed Professor of the Tokyo Imperial University in 1900 and held the post until June, 1901. It was in 1900 that he first entered the service of the Tokyo Electric Railway Company, one of three electric railways then existing in Tokyo City. When these three railways amalgamated under one company, he was appointed the Chief Engineer of the new system and held the position until after the railway was bought up by the Municipal Government.

Interurban Centers and Interurban Cars

PROVIDENCE



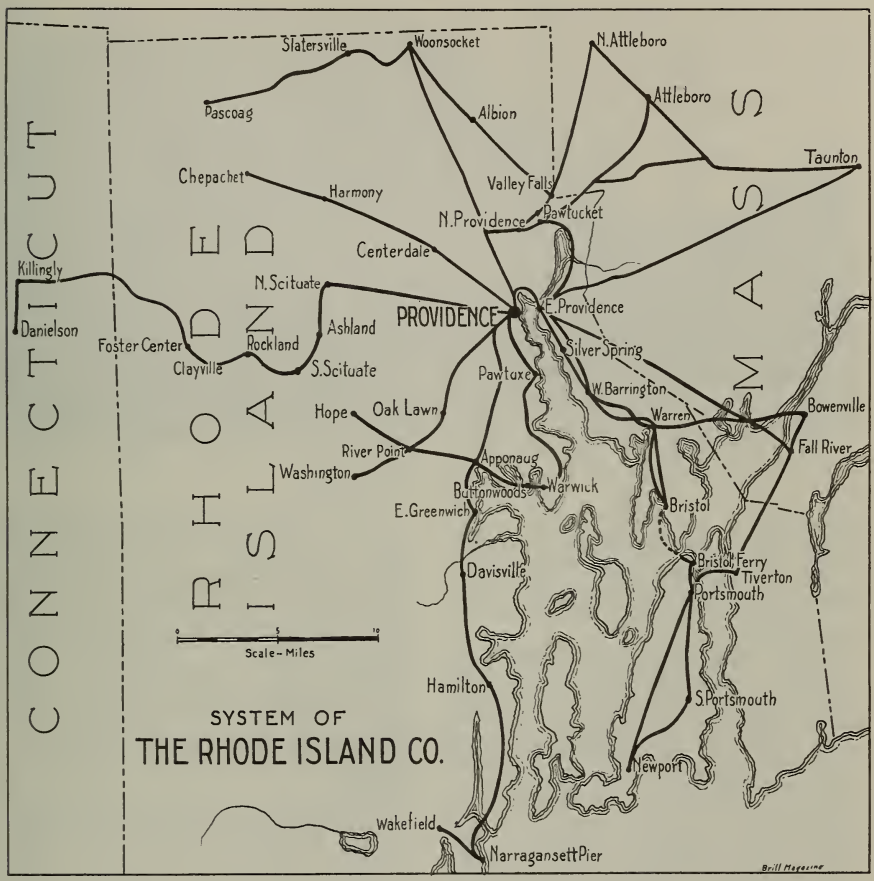
PROVIDENCE, Rhode Island, the capital city of the state, is situated on the Providence River and the head of Narragansett Bay, and is about 35 miles from the Atlantic Ocean, 45 miles by rail from Boston and 188 miles from New York. The city is served by the New York, New Haven & Hartford Railroad and, on completion of the Southern New England Railroad, an extension of the Grand Trunk Railroad, will be the terminus of that road. Providence is served also by steamboat lines to Fall River, Newport, New York, Baltimore and Norfolk, and a steamship line to the Mediterranean stops at Providence on each trip.

Providence has been termed "New England's Southern Gateway," as it is the nearest, the easiest and the cheapest New England port to reach from southern waters, and has the most centrally located harbor with respect to the majority of the population of New England. It is nearer than Baltimore or New Orleans to Rio Janeiro, Buenos Ayres and all the principal eastern ports of South America and two days nearer than San Francisco to the Panama Canal.

Providence proper, with an area of 18.29 square miles and a population at the last census of 247,660, has a density of 1,083.8 persons to the square mile, the greatest of any city of its class, while the Metropolitan District (Greater Providence) area as defined by the state has a population of 437,844. The total population of the state at the last census was 595,836.

The city is the second largest in New England and its harbor facilities have done much to boom it. Since the middle of the nineteenth century the Federal and State governments have done a great deal of work on the harbor, increasing the depth and width of the channel and creating anchorage basins which are ample to take care of a large amount of shipping. This anchorage area by 1909 had been increased to close to 300 acres.

Of greater importance to Providence than its commerce, however, are its manufactures. The factory products of the city total nearly half of the state's output. Close to half of the wage-earners of the state are located in Providence and nearly half of the worsted goods and more than a quarter of the textile goods made in the state were shown to have been manufactured in Providence by comparatively recent statistics dealing with the business of the city.



These same statistics showed that four-fifths of the rubber and elastic goods and nine-tenths of the foundry and machine-shop products made in the state were turned out in Providence. The city ranks high in the country in the manufacture of jewelry, the total output amounting to about a sixth of the city's factory product.

The city was founded in 1636 by Roger Williams, an exile from Massachusetts, and its early history is very closely allied with the early history of the state of which it is the capital, it being one of the four towns out of which this commonwealth was formed. The place was named by Williams because of what he felt to have been Divine guidance in sending him there. He and a few companions who had accompanied him into exile immediately established a town government with monthly town meetings, and in the next year, 1637, after the arrival of a few more settlers, the real basis

of the present commonwealth was laid—in the shape of a plantation covenant, which completely separated religious and civil affairs.

Much of the history of the United States centers around Providence, the city having figured especially in the War of Independence. During this war much of the privateering that was done was conducted from Providence. The British occupation of Newport during that war shifted the important foreign commerce of that city to Providence, but later on the influence of the superior rail facilities of New York and Boston had its effect. Up until 1900 there were two capitals of the state—Providence and Newport; since 1900 Providence has been the sole capital.

Under the municipal park commissioners there are 33 public parks with a total area of 645 acres and the city supports summer playgrounds. In the metropolitan park district there is a large park system which is controlled by the state board of metropolitan parks. Also there is a well-developed system of boulevards connecting the several parks and the other public reservations. The metropolitan reservations total about 700 acres and in addition there are numerous fine municipal reservations.

The public school system of the city has benefitted very materially by the presence of Brown University, the faculty of which cooperates to a very large extent with the schools of the city. Many of the departments of the public school system are under the direct supervision of the heads of the university.

The Rhode Island Company, with headquarters in Providence, owns or controls all the street railway lines in Providence, and with exception of the lines in Newport County and in Westerly, the street railway lines in the state, serving directly or indirectly the most populous sections of Rhode Island.

Providence is connected immediately to the north with the city of Pawtucket, having a population of 55,335, and with Central Falls,



Interurban Centers and Cars. Terminal waiting station, Exchange Place, Providence. Union Station in background



Interurban Centers and Cars. Dorrance Street, corner Washington Street, most congested corner in city

a city of 23,708 population. These cities are in turn connected with the city of Woonsocket, situated about 15 miles north of Providence and having a population of 40,075. The cities of Providence and Woonsocket are connected also by a direct interurban line, passing through the towns of North Providence, Lincoln and North Smithfield, with a combined population of 19,734. From Woonsocket a line runs through North Smithfield and Burrillville to Pascoag, a distance of 15 miles.

Providence is connected to the east with Bristol, R. I., a distance of 17 miles, having a population of 10,302, by a line passing through East Providence (population 18,584), Barrington (2,932) and Warren (7,241).

The city is connected to the south by several lines with the towns of Coventry, East Greenwich, Warwick and West Warwick, having a combined population of 38,866, passing through Cranston, a city of 26,940. One of the lines extends to Narragansett Pier and Wakefield in Washington County, serving a population of 12,300.

Providence is connected to the west by an interurban electric line, with Danielson, Connecticut, passing through the towns of Johnston, Scituate and Foster, R. I., having a combined population of 11,110, to East Killingly, Conn., where it connects with the Shore Line Electric Railway Co., which serves the cities and towns of Eastern Connecticut.

In addition to the above, the city is connected with Taunton, Mass., a distance of 18 miles, and with Brockton and other points in Eastern Massachusetts, by the Bay State Street Railway Co., with Attleboro, Mass., a distance of 12 miles, and North Attleboro, Mass., a distance of 14 miles, by the Interstate Consolidated Street Railway Co., and with Fall River, Mass., a distance of 18½ miles, by the Providence & Fall River Street

Railway Co., connecting at Fall River with cars for New Bedford, Mass., and Newport, R. I. The cars of each of these companies are operated by the Rhode Island Company from the state line of Massachusetts into the center of Providence. Providence is also connected without the State of Rhode Island via Woonsocket, R. I., with Worcester, Mass., a distance of 45 miles, by the Worcester Consolidated Street Railway Co., and with Franklin, Wrentham, Plainville and Milford in Massachusetts by the Milford, Attleboro & Woonsocket Street Railway Company. The Rhode Island Company also operates the Narragansett Pier Railroad, a steam road running from Narragansett Pier to Kingston, R. I., a distance of 8½ miles, where it connects with the main line of the New York, New Haven & Hartford Railroad Co., running between Boston, Mass., Providence, R. I., and New York.

The Rhode Island Company system comprises 310.48 miles of single or first main track, 52.17 miles of double or second main track, and 37.80 miles of turnouts, sidings and car-house track, a total of 400.45 miles. Of the tracks outside the cities, about 79 miles are on public highways and 76 miles on private right-of-way. With the exception of the Narragansett Pier Road all the lines are operated by the single overhead trolley system, 600 volts.



Interurban Centers and Cars. Passenger station at Longmeadow

The main power station of the company is located on Manchester Street, Providence, at tide water. The present rated generating capacity is 40,500 kw., 35,500 a. c. 11,000 volts, and 5,000 d. c. 600 volts. The ultimate capacity of the station is approximately 90,000 kw. The company also has a small power station at Rockland, R. I.,

with a rated generating capacity of 1,000 kw.

In addition to a sub-station located at the Manchester Street Power Station with a rated capacity of 9,000 kw., the company distributes current from the main generating station through five sub-stations, one at Dike Street, Olneyville, with a rated capacity of 5,000 kw.; one at Pawtucket, R. I., 3,000 kw.; Westcott, R. I., 1,200 kw.; River View, R. I., 1,600 kw., and Barrington, R. I., 800 kw. The Manchester Street Power Station also furnishes power to the Interstate Consolidated Street Railway Co., and Attleboro Branch, through a substation located at Attleboro, Mass., with a rated capacity of 1,000 kw.

The Rhode Island Company purchases power from the Blackstone Valley Gas & Electric Co. The power is generated at the Woonsocket plant of that company and is distributed in part through two substations maintained by the Rhode Island Company, one located in the town of Lincoln, R. I., with a rated capacity of 1,000 kw.,



Interurban Centers and Cars. Main power station, Manchester

the other at Oakland, R. I., 800 kw. Power is purchased also from the Narragansett Electric Lighting Co. and distributed through two portable substations maintained by the Rhode Island Company, each with a rated capacity of 300 kw., one located at Hamilton, R. I., the other at Narragansett Pier, R. I.

The Rhode Island Company operates freight cars over all of its suburban lines, the character of



Interurban Centers and Cars. Main freight house, Eddy Street, Providence



Interurban Centers and Cars. Stretch of double track on Buttonwoods line

the freight being general and miscellaneous, and switching. The main freight house is located on Eddy Street, Providence, with a capacity for twenty-two cars. Direct freight service is also maintained with Boston, Taunton, Brockton, Fall River, Attleboro and North Attleboro, Mass., and with Danielson, Dayville and Putnam, Conn. Express business is handled by the Adams Express Company over two divisions.

The standard type of passenger car, which was adopted by the company some four years ago with the approval of the city officials of Providence, measures 41 ft. over the vestibules, 42 ft. over the bumpers, 8 ft. 6 in. over the side sheathing, 18 ft. 4 in. centers of bolsters and has a seating capacity of 40. The carbody weight, including brake and electrical equipment, is 20,500 lbs., and the total weight of car and trucks fully equipped is 43,260 lbs. The car is built for double-end operation on an entire steel underframe, with wooden side construction, mounted on double trucks, with four 40 hp. motors. The cars are constructed for platform collection, a register being used at present, and are all run singly.

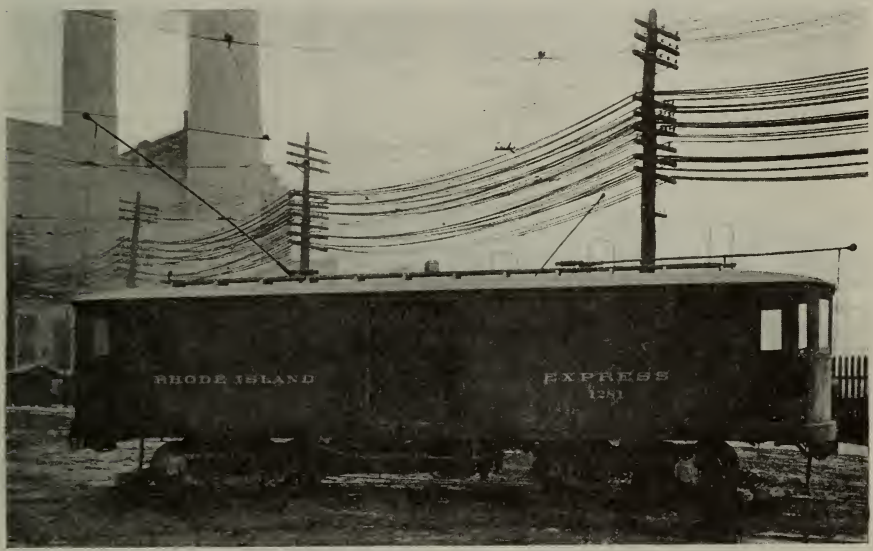


Interurban Centers and Cars. Interesting type of car in use on lines of company

In addition to the above the company has various types of cars in operation. The standard type of open car for summer service is a fifteen-bench double-truck car 32 ft. 7 in. over the bulkheads, and 40 ft. 6 in. over the crown-pieces. The complete weight of the car with trucks and electrical equipment is 41,850 lbs. These cars are popular in Providence for pleasure riding and excursion travel to the pleasure resorts on Narragansett Bay and the outlying districts, as well as for city travel.

The total number of passenger cars available is 1,015, 611 closed and 404 open cars. The number of cars used in normal operation is 214 and at rush hours 508. The highest schedule speed is 27 miles per hour. In congested districts the municipal regulation is from 6 to 9 and 12 miles per hour. The average number of stops per mile is about fifteen.

Traffic statistics for the year ending June 30, 1916, showed a total of 121,517,778 passengers carried, of which 102,578,077 were revenue passengers, 16,881,465 transfer passengers and 2,058,236 non-revenue passengers. The total car miles were 16,110,220.



INTERURBAN CENTERS AND CARS. Standard type of freight express car

The company very apparently has realized the value to it of regular, organized publicity work and tries in every way possible to place itself before the public in a favorable light. Its efforts along this line include convenient time tables, which invariably bring a map of the company's lines before the reader's eye, tending, of course, to increase travel by outlining the routes made available to and from the various points about Providence.

New Cars for Burlington County Transit

BRILL 76-E TRUCKS

FOR operation between the New Jersey towns of Moorestown, Hainesport, Masonville, Hartford, Burlington and Mt. Holly, the Burlington County Transit Company, of Hainesport, New Jersey, recently purchased from The J. G. Brill Company, three 35 ft. 11 in. closed vestibule motor cars. These cars were bought principally for the purpose of replacing older equipment which was destroyed in a comparatively recent fire.



New Cars for Burlington County Transit. These cars were bought to replace equipment which was destroyed in a comparatively recent fire. The operation is about sixteen miles long, running through the heart of one of New Jersey's best truck-farming districts

The carbarn, power plant and the main offices of the company are located at Hainesport, a small town of about 500 inhabitants. Here an important industry is the digging of gravel from along the banks of the Rancocas Creek. Also, moulding-sand for use in the local foundries, of which there are several, is obtained in this district. Camden, Burlington, Florence and Bristol have large foundries employing a large number of men and using, of course, a good quantity of the moulding-sand mentioned.

At Burlington there is located a cast-iron-pipe foundry which is one of the largest in the country, being affiliated with another foundry located in Camden. This foundry is a very busy enterprise, working day and night in shifts, and, of course, the number of men employed and their need, as well as the need of their families, for transportation facilities aids the operation of the company. Burlington is a thriving community with a total population of about 11,000.

Mount Holly, which also is

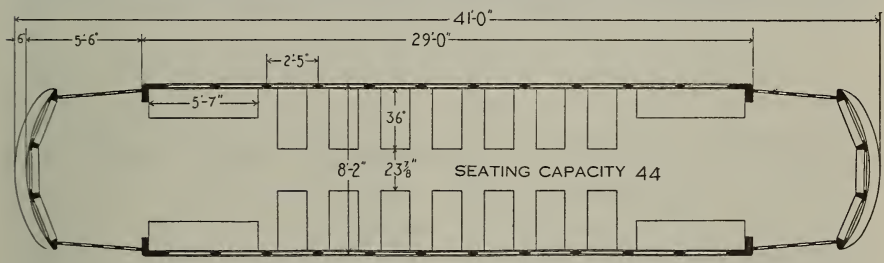
served by the company, is a county seat, and has a population of about 6,000. It is one of the best looking residential towns in New Jersey. Located on the Rancocas Creek, it is noted for the fine scenery surrounding it. Mount Holly is but a few miles from Browns Mills, a very popular health resort. Access to Browns Mills is possible only through Mount Holly, from which place train is taken to the resort.

Moorestown, another residential place, also is located on the line of the company. At Moorestown connection is made with the Public Service line direct to Camden. The company also makes connection with the lines of the Public Service Company at Burlington, which is located on the Trenton-Camden Division of the Public Service.

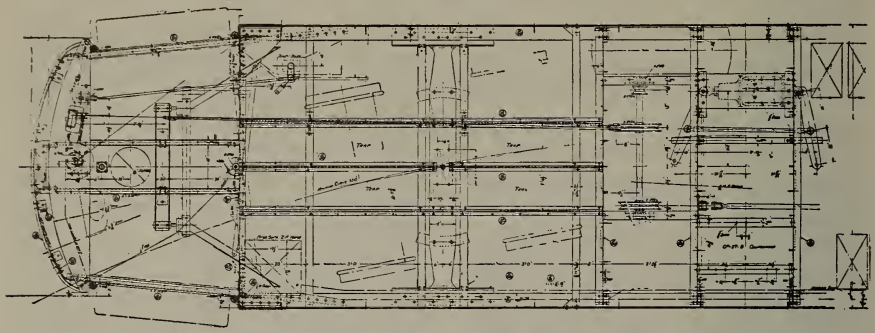
Truck farming is one of the most important industries—if not the most important industry—of the territory which is served by the company. Burlington is located right in the heart of the truck-farming district, which will serve to give an idea of the effect of the surrounding territory upon the grain farmer.

Burlington Island, located in the river opposite Burlington, is a fairly large island, measuring about five miles in circumference. It is a favorite camping ground and in summer is dotted with tents of campers. Besides, there is a park at one end of the island, called Burlington Island Park, which is reached by ferry and by steamers from Philadelphia. There are two farms on the island.

The cars are built upon underframes in which the side sills are of 5 by 3½ in. angle, laid with the long leg horizontal and reinforced



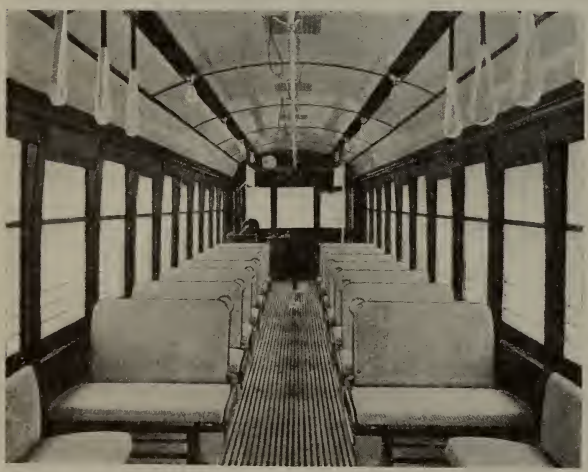
NEW CARS FOR BURLINGTON COUNTY TRANSIT. Height from track to underside of side sills, 2 ft. 2 1/8 in.; height from underside of side sills over trolley boards, 9 ft. 1 7/8 in.; height from floor to center of headlining, 7 ft. 9 in.; track to step, 15 in.; step to floor, 13½ in.; weight of carbody, 17,710 lb.; weight of electrical equipment on body, 930 lb.; weight of airbrake equipment, 1000 lb.; weight of trucks, 9600 lb.; weight of motors, 3500 lb.; total weight, 32,740 lb.



NEW CARS FOR BURLINGTON COUNTY TRANSIT. The side sills are of angle, reinforced under the bolsters with another angle. The end sills and other crossings are of pressed steel. The bolsters are of cast steel, and both the outside and the inside platform knees are of channel

at the bolster with a 6 by 3½ in. angle to relieve the strain. The crossings and the end sills are of pressed steel, the former ⅛ in. thick and the latter 3/16 in. thick. The bolsters are of cast steel, bolted to the side sills and to the reinforcing angles. Suitable openings made in the bolsters allow for the passage of the brake rods, cable conduits, etc. The outside platform knees are of 7 by 3½ in. angle reinforced under the end sill with 2 by 2 in. angle. The center platform knees are channel.

The cars have double flooring, the bottom floor of yellow pine and the upper floor of maple. The flooring in the aisle of the car is grooved. A 2-in. ramp runs from a point over the center of the bolster to the end sills. The platform flooring is of maple.



NEW CARS FOR BURLINGTON COUNTY TRANSIT. In addition to the truck farming, which forms so important a part of the business of the territory served by this company, there are several large foundries. Another sizable industry is the digging of gravel and moulding-sand from along the banks of the Rancocas Creek, which, incidentally, is noted for its beautiful scenery

The platforms are provided with three windows with single sash arranged to drop, the center sash provided with a rack to make the sash adjustable at any height. Each of the step openings is provided with folding vestibule doors in two sections, arranged to fold against the inside vestibule lining. The lower portion of the doors is paneled and the upper portion is glazed.



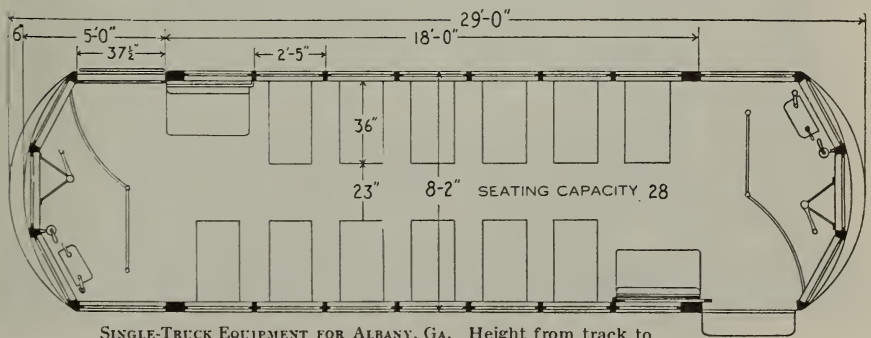
SINGLE-TRUCK EQUIPMENT FOR ALBANY, GA. One of the most interesting features of this car is the use of the Renitent Post system, a recent Brill invention which has created for itself a very decided favor in the electric railway field

Single-Truck Equipment for Albany, Georgia

BRILL RENITENT POSTS; 21-E TRUCK

THE American Car Company recently has delivered to the Albany Transit Company, of Albany, Georgia, an equipment of a most interesting type, illustrated herewith. The car is an 18-ft. closed motor car, mounted on a Brill 21-E Truck. The town in which this power-saving, economical equipment is to be used has a population of about 8,000. The company generates its own power for the operation of its line.

The underframe is of all-steel construction. The side sills are of 3 by 3 in. angle, the crossings of 4 in. channel, the bumpers of 5 in. channel, the end panels being



SINGLE-TRUCK EQUIPMENT FOR ALBANY, GA. Height from track to underside of side sills, 24⅞ in.; height from underside of side sills over trolley boards, 8 ft. 8⅛ in.; height from floor to center of headlining, 8 ft. 0⅞ in.; track to step, 16½ in.; step to platform, 13½ in.; weight of carbody, 8000 lb.; weight of truck, less wheels, axles and gears, 3025 lb.

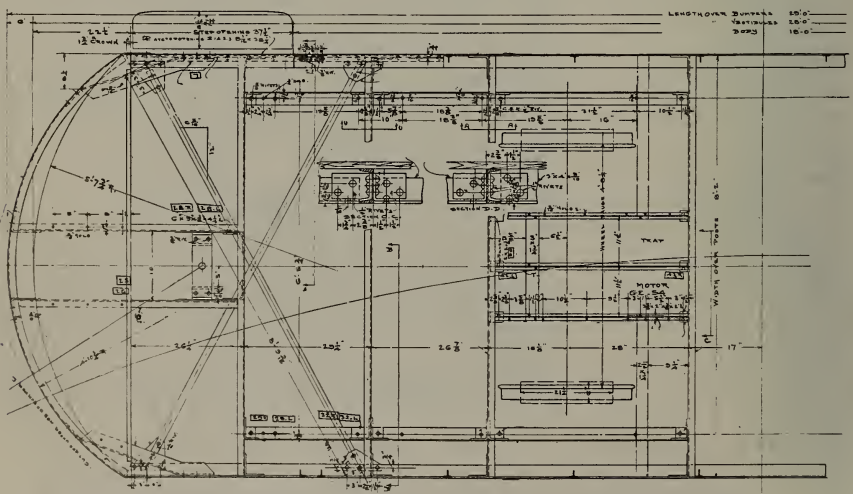


Single-Truck Equipment for Albany, Ga. The equipment is a typical light-weight, single-truck car, built with the view of reducing power charges and maintenance costs

braced diagonally with ¼ by 1½ in. bars. Subsills of 3 by 3 in. angle are used, extending the length of the carbody. The platform knees are of 4 in. channel.

The body framing is of steel and the construction includes the Brill Renitent Post, a recent Brill invention, which is attracting a great deal of attention to itself from the railway field. This invention supplies a sash which is water-tight, rattle-proof, cannot be racked by careless handling, is safe against sudden dropping and is readily removable from its casings without the use of tools, the sashes in addition being interchangeable from window to window. This Renitent Post system is described in greater detail in a folder recently published (Bulletin No. 229).

The roof is of the Brill Plain Arch Type, extending the full length of the car and strengthened with concealed steel rafters.



Single-Truck Equipment for Albany, Ga. The underframes are of steel, the side sills of angle, the crossings and bumpers of channel, and the sub-sills of angle. Diagonal braces are used

New Cars for Beaumont Traction Company

LIGHT-WEIGHT 21-E TRUCKS

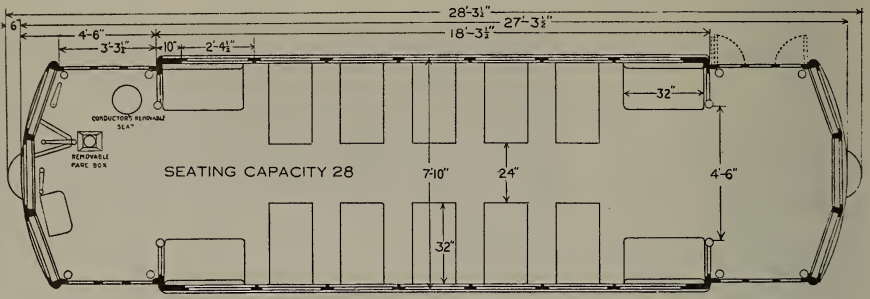
SEVEN 18 ft. 3½ in. closed cars mounted on Brill Light-weight 21-E Trucks, with a carbody weight of only 6,800 pounds, recently have been completed for the Beaumont Traction Company, a Stone and Webster operation located in Beaumont, Texas. Beaumont, a city of about 25,000 population, is located in Jefferson County, in the southeastern part of the state, and it is separated from Louisiana by only one county. The city ranks tenth among the cities of Texas.

Oil boomed Beaumont and hence the nature of the town and its outlying districts and neighboring territory and the effect on the operation for which these cars have been built readily is apparent. The principal industries are petroleum production and refining, rice mills, lumber and iron works.

These cars are very similar to the type of an order built for the same company in 1915, and described in BRILL MAGAZINE for December of that year. These latter cars were bought for replacements and to serve as a supplement to the old equipment, which for the most part consisted of wooden cars swung high from the ground. These last two orders—those shown in BRILL MAGAZINE for December, 1915, and those illustrated herewith—are mounted on Brill Light-weight 21-E Trucks, which have been creating so much favor for themselves in the electric railway field. The Light-weight 21-E is built with 24 in. wheels, which, when consideration is taken of the



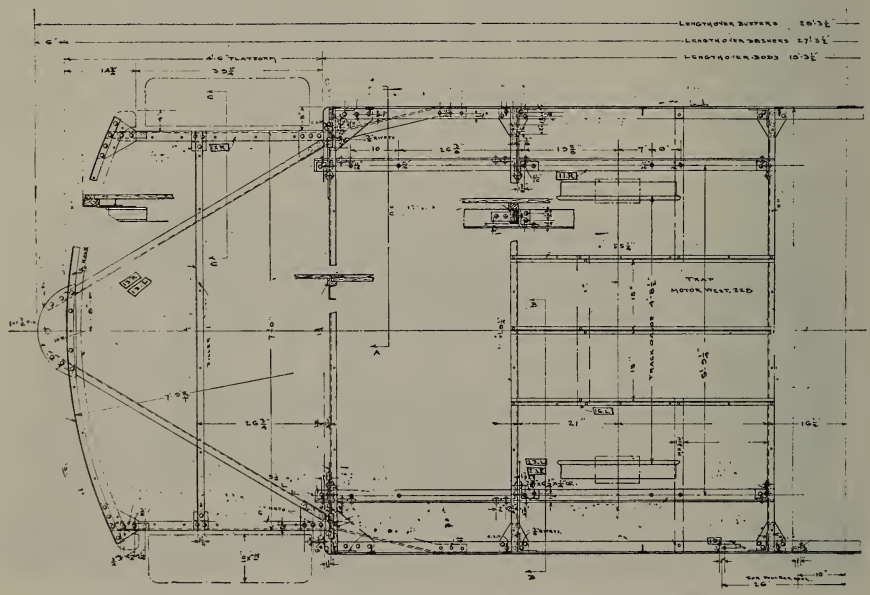
NEW CARS FOR BEAUMONT TRACTION. These cars are practically the same as the light-weight cars built for the same line in 1915 and described in BRILL MAGAZINE for December of that year. Reference to that issue will give a further idea of the operation and the adaptability of the car, shown herewith, to it



NEW CARS FOR BEAUMONT TRACTION. Height from track to underside of side sills, 21 13/16 in.; height from underside of side sills over trolley boards, 8 ft. 5½ in.; height from floor to center of headlining, 7 ft. 8 11/16 in.; track to step, 15 in.; step to platform, 12 5/16 in.; weight of carbody, 6800 lb.; weight of truck, less wheels, axles and gears, 2500 lb.

fact that the old equipment of the company was mounted for the most part on 33 in. wheels, speaks eloquently for the saving in power consumption and the general economy that the use of the new cars will effect.

The cars are steel almost entirely, whereas the older equipment of the company consisted mostly of wooden cars. This steel construction, instead of making the cars heavy, has made possible the getting together of a car that will stand up under the hardest kind of service, but which at the same time will make a large saving in power. maintenance, etc.



NEW CARS FOR BEAUMONT TRACTION. The side sills are of angle, the cross sills of channel and the truck sills of angle. The platform knees are of channel and the dashers are of angle. The platforms are braced with angle cross members and with channel diagonal sills

The introduction of the Brill Light-weight 21-E could not have come at a more opportune time, in view of the tremendous demand for light-weight, economical, power-saving equipment which has been manifest throughout the electric railway field for some little time. The introduction of this truck was a very important step in car-design improvement, the saving in weight effected by it over the regular Brill 21-E Truck being something close to 1,800 pounds. The Light-weight 21-E will carry a car whose weight when empty is 8,640 pounds, and it will take care of a passenger load of 9,000 pounds. Complete, it weighs but 3,800 pounds.

Standard construction for this new 21-E calls for the use of 24 in. wheels, which, of themselves, make a very considerable reduction in the total weight. Its wheelbase is 8 ft., and the use of the small wheels allows this wheel-base to be made 6 in. longer than would be the case were 33 in. wheels used. The brake rigging, which is arranged inside the wheels, effects another very considerable decrease in the weight.

The construction of the new truck follows almost exactly the construction of the regular 21-E, the chief reduction in weight being effected by the reduction of the size of the axles, the lighter brake rigging, lighter wheels, lighter springs and the use of a lighter side-bar.

In the underframes upon which these cars are built side sills are of 2½ by 2½ in. angle extending the full length of the car in one continuous piece. The cross sills are of 3 in. 4 lb. channel fastened to the side sills and the truck sills (2½ by 4 in. angle) with gusset plates. At the corner post the cross sills are reinforced to carry the platform knees, which are of 6 in. 8 lb. channel set in about 5 in. from the side sill angle. The dasher angles measure 1½ by 1½ in. and are bolted to the platform knees. The platform is braced with a 1½ by 1½ in. angle cross member and with 3 in. 4 lb. channel diagonal sills.



NEW CARS FOR BEAUMONT TRACTION. These cars are mounted on the new Brill Light-weight 21-E Trucks, which have created such a great amount of favor for themselves in the electric railway field. Standard construction for this new light truck calls for the use of 24-in. wheels. A reduction of weight totaling something like 1800 pounds under the weight of the regular Brill 21-E Truck has been effected in this new light truck

Storage Battery Equipment for Cambria & Indiana

COMBINATION PASSENGER AND BAGGAGE

THE J. G. Brill Company recently delivered to the Cambria & Indiana Railroad Company a 30-ft. combination passenger and baggage vestibule storage battery car mounted on Brill 69-E trucks. This company operates a passenger service in the sparsely-settled mining district of Cambria and Indiana Counties, Pennsylvania. Its operation is steam, but from time to time the steam equipment has been supplemented by the purchase of storage battery units. In addition to its passenger service the company hauls a large amount of ore and coal from the mines to Rexis, where connection is effected with the Clearfield & Cresson Division of the Pennsylvania Railroad. A previous order was described in BRILL MAGAZINE for Dec., 1914.

The underframe is of steel, built up of standard structural shapes. The car is sheathed with sheet steel extending from the under side of the side sills to the belt rail.

The roof is of the Brill Plain Arch type the full length of the car and is strengthened with concealed steel rafters, which take the strain due to the trolley apparatus. The platform hoods are of poplar, same as the roof, and, like the roof, are covered with cotton duck.

At the rear end of the car on each side of the step opening there are placed double stationary steps, each provided with a riser. At diagonal corners of the car there are provided motorman's steps and roof landings.

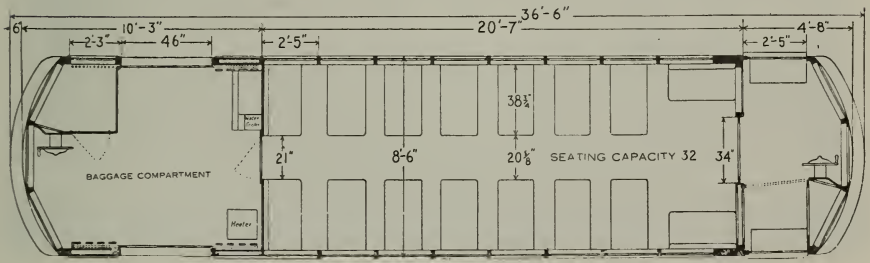
The car is equipped with Brill Patented Angle-iron Bumpers and Brill "Dumpit" Sandboxes. Brill Dedenda Alarm Gongs also were specified for the car. There are six Brill Winner transverse seats on each side of the car, provided with reversible backs and Brill grab-handles. At each end of the car there is placed a seat to take care of two persons, the seats at the baggage end arranged transversely with their backs against the partition. At the opposite end of the car there is a longitudinal seat with capacity for two persons.



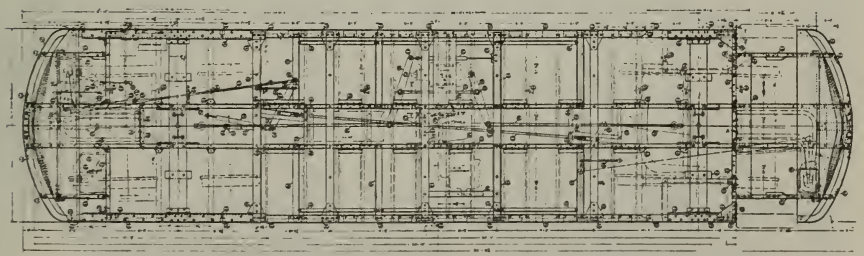
STORAGE-BATTERY EQUIPMENT FOR CAMBRIA & INDIANA. The seating capacity of the car—32 passengers—is amply large to adapt it perfectly to the service for which it is designed. In addition, the baggage compartment makes the equipment well suited to the conditions it will satisfy



STORAGE-BATTERY EQUIPMENT FOR CAMBRIA & INDIANA. This company, operating through the mining district of Cambria and Indiana Counties, has supplemented its steam equipment from time to time with storage-battery cars. The car illustrated is peculiarly well adapted to the service, because of its combination feature



STORAGE-BATTERY EQUIPMENT FOR CAMBRIA & INDIANA. Height from track to underside of side sills, 2 ft. 10⅝ in.; height from underside of side sills over roof, 8 ft. 7¾ in.; height from floor to center of headlining, 7 ft. 7¾ in.; track to step, 15½ in.; step to step, 14 in.; step to floor, 13⅜ in.; weight of trucks, 12,520 lb.; car complete with trucks, electrical and air equipment, 43,000 lb.



STORAGE-BATTERY EQUIPMENT FOR CAMBRIA & INDIANA. Many Brill specialties are included in the equipment of the car. These include Brill Angle-iron Bumpers, Brill "Dumpit" Sandboxes, Brill Dedenda Alarm Gongs, Brill "Winner" Seats

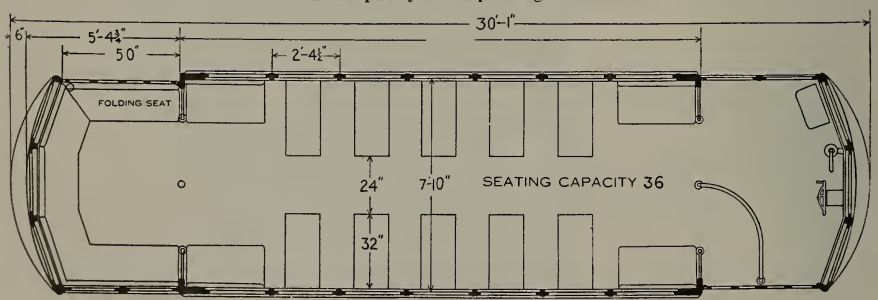
Single-End Cars for Union Depot Bridge & Terminal Company of Kansas City, Missouri

BRILL 21-E TRUCK; RENITENT POSTS

FIVE one-man cars of a most interesting type recently have been shipped from the works of the American Car Company, of St. Louis, to the Union Depot Bridge and Terminal Company, of Kansas City, Mo. These cars are built for single-end operation, with doors at the diagonally opposite corners. Every available inch of space is taken advantage of and, by placing seats across the rear of the car and opposite the rear door, the seating capacity is brought up to a total of 36 passengers, which compares very favorably with the



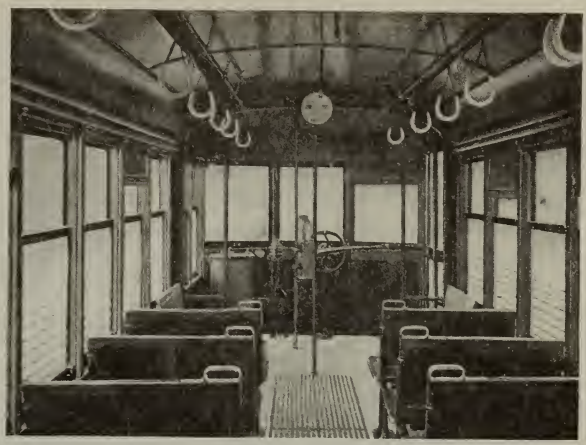
SINGLE-TRUCK CARS FOR KANSAS CITY. This car is of particular interest because of the way in which every available inch of space has been utilized to take care of the passengers. The seating capacity (36) is remarkable for a car measuring but 18 ft. 3½ in. over the corner posts. Including the standing space, the car has capacity for 64 passengers



SINGLE-TRUCK CARS FOR KANSAS CITY. Height from track to underside of side sills, 21 1⅛ in.; height from underside of side sills over trolley boards, 8 ft. 5 1/16 in; height from floor to center of headlining, 7 ft. 6 1/16 in.; track to step, 15 7/8 in.; step to platform, 12 5/16 in.; weight of carbody, approximately 8000 lb.; weight of truck, less wheels and axles, 2700 lb.

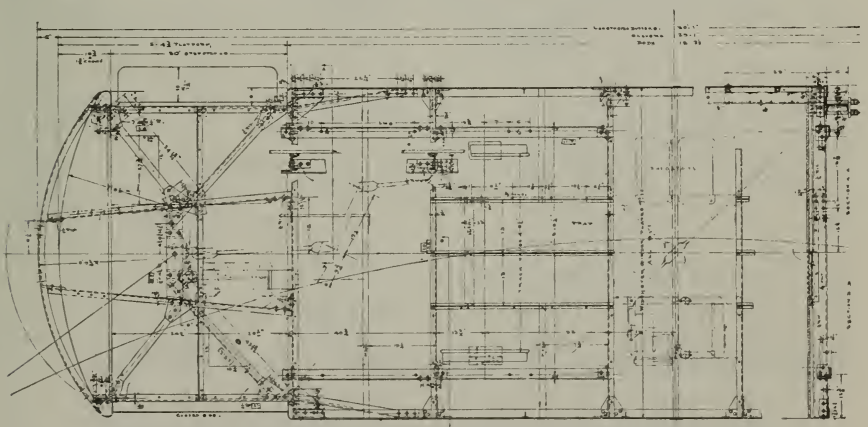
capacity of the average double-truck car.

These light-weight cars are attracting a great deal of attention throughout the electric railway field, because of the economy which is being effected everywhere they are installed. In Kansas City particular attention is being paid to the subject. The cars are taking the place of old equipment which weighed 55,600 pounds. The new cars weigh approximately 10,000 pounds, which indicates a saving per car of 45,600 pounds. Because of certain fluctuating items which have to be taken into consideration in any computation, it is impossible to tell definitely just how much will be saved to the company. However, an approximation indicates a saving to the company of $750 per car per year, in addition to which the saving in track, wheels, etc., must be taken into consideration. Including the standing room the car conveniently can accommodate 64 passengers, a total which certainly is worthy of attention.



SINGLE-TRUCK CARS FOR KANSAS CITY. Across the rear of the car and opposite the rear door there are placed extra seats, which bring the capacity of the car up to a very noteworthy figure

The cars are built upon underframes in which the side sills are of angle, the cross sills and the platform knees of channel.



SINGLE-TRUCK CARS FOR KANSAS CITY. The side sills are of angle, the cross sills of channel, and the platform knees are also of channel

Single-Truck Cars for Pekin, Illinois

ONE-MAN OPERATION

TWO double-end, 18 ft. 3½ in. prepayment cars, each mounted on a Brill 21-E Truck, have been purchased from the American Car Company, of St. Louis, by the Pekin Municipal Street Railway, of Pekin, Illinois. This city is the third in the United States to own and operate a municipally-owned line. This road is an exceedingly interesting one, since the one-man method of operation is used, indicating the unqualified sanction of the city authorities, who of necessity control the method of operation.

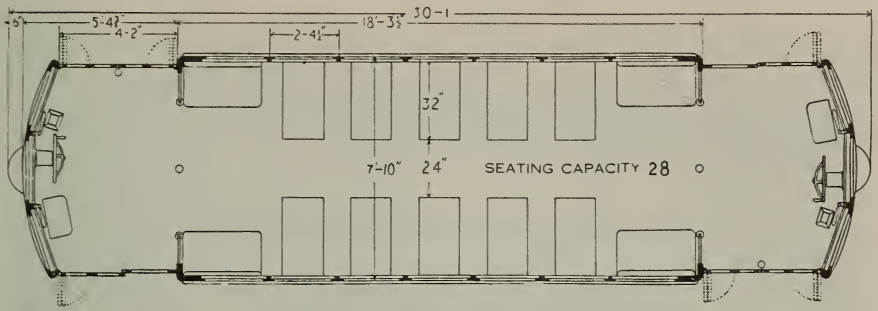


SINGLE-TRUCK CARS FOR PEKIN, ILL. This operation is the third municipally-owned in the country. The cars are operated under one man, indicating the favor which that method of operation has found with the local authorities

Pekin is located in Tazewell County, on the banks of the Illinois River, and ten miles south and east of Peoria, which is the second largest city in the State of Illinois. The town is made up of a population of about 12,000, and is located in the heart of a rich farming community, thriving and progressive.

The system consists of about three miles of track, built with stub ends, the passing switches being located at the center of the two divisions of the line. The necessity for cars designed for double-end operation consequently is very apparent. Several manufacturing establishments, employing from one to six hundred men, are located either in or immediately adjacent to Pekin, and of course the travel of these employes to and from their homes helps boost the revenue of the company. One of these manufactories is located right at the end of the street-car line.

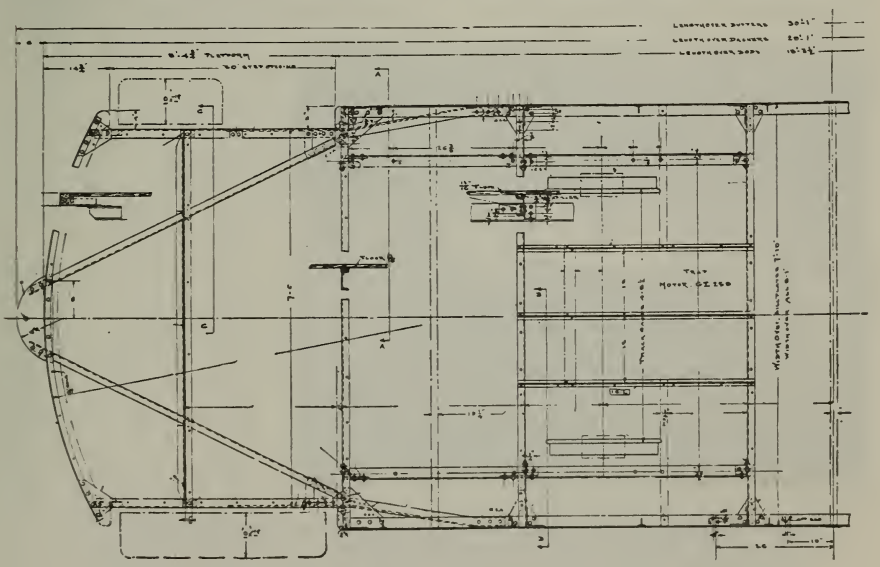
The ordinance of the city applying to the street-car department calls for what is locally termed the motorman-conductor. The operator drives the car and collects the fares as the passengers enter. The



SINGLE-TRUCK CARS FOR PEKIN, ILL. Height from track to underside of side sills, 21 13/16 in.; height from underside of side sills over trolley boards, 8 ft. 5½ in.; height from floor to center of headlining, 7 ft. 8 11/16 in.; track to step, 15 3/8 in.; step to platform, 12 5/16 in.; weight of truck, less wheels, axles and gears, 2455 lb.; weight of carbody, 8000 lb.

east end of the company's line brings in a large amount of business. At this eastern terminus there is maintained by the local park board a fine park. Also within a short distance of this terminus there is located a manufacturing plant and the mines are located within a mile of the terminus. These mines employ about three or four hundred men. Within a half mile of this same eastern terminus there is located the Pekin Country Club.

The spirit of co-operation manifested by the citizens of Pekin has been responsible for the success of the operation. Sunday band con-



SINGLE-TRUCK CARS FOR PEKIN, ILL. The underframes are of steel, the side sills of angle, cross sills of channel, dashers of angle, and diagonal platform sills of channel. The platform knees also are of channel

certs are given at the park during the summer, and also many entertainments are held by various lodges and organizations. In the near future the company intends to extend its line to the golf links, thereby receiving the workmen from the mines and the manufacturing plant, and also taking care of the pleasure seekers. The only difficulty facing the operation lies in the fact that the company has not as yet extended its lines sufficiently to tap the arteries that might furnish considerable additional revenue from more passengers to be carried.

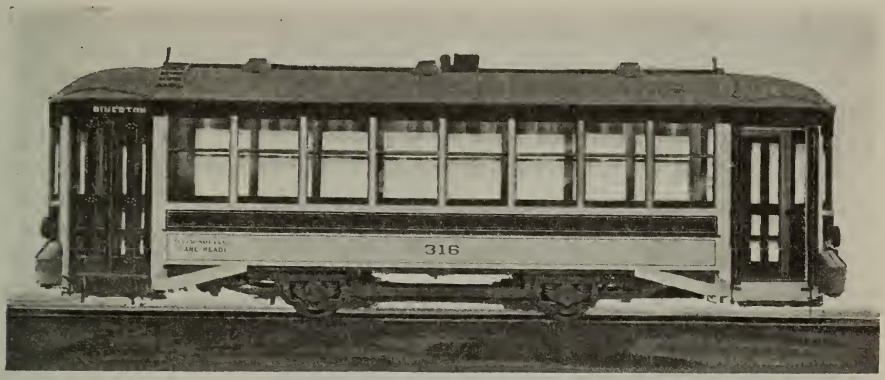
Power for the operation of the company's equipment is purchased from the Central Illinois Light Company. Six tickets for a quarter are sold, through the several drug stores and business houses. No passes are issued, not even to city employes. Each day the motorman-conductor turns over his returns to the city clerk and is given a receipt. The funds are then turned over direct to the city treasurer. The entire operation of the line is in charge of the Commissioner of Public Property.

Based on the itemized statement of accounts with the city treasurer, the Commissioner of Public Property has found the experience of the company's operation with single-truck, one-man cars to be very satisfactory. The economy of operation with these light-weight cars is indicated by the fact that the total earnings over a period of sixteen months exceeded the disbursements by about 50 per cent., the net earnings being about one-third of the gross.

The cars are built on all-steel underframes, in which side sills of 2½ by 2½ in. angle are used. The cross sills are of 4 in. channel fastened to the side sill angles and truck sills with gusset plates. The dasher angles are of 1½ by 1½ in. steel and the diagonal platform sills are of 3 in. channel extending 6 in. beyond the dasher and provided with a 3/16 in. plate, riveted top and bottom, to form the drawbar pocket. The platform knees are of 6 in. channel, ample for good support.



SINGLE-TRUCK CARS FOR PEKIN, ILL. The cars are built on underframes which are exact duplicates of the underframes of the Centralia Traction Company's cars (BRILL MAGAZINE, July, 1916), and the Austin Street Railway cars (BRILL MAGAZINE, April, 1916). In general, the cars are very similar except for the arrangement of the doors, the difference being readily apparent by reference to the articles mentioned

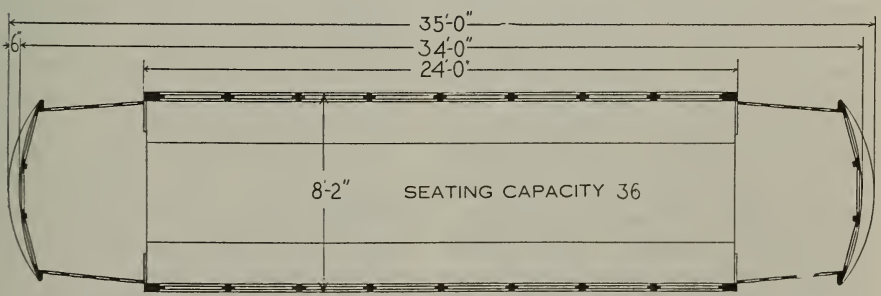


SEMI-CONVERTIBLE PREPAYMENT CARS FOR PORTLAND, MAINE. These cars are for use in a city whose street railway operation is affected very materially by the tremendous increase of the population in the summer vacation months. For such an operation these new cars seem remarkably well suited, since they form an economical means of offering good transportation facilities during the "lean" times and also are of sufficiently large capacity to care for the heavy demands of the summer months

Semi-Convertible Prepayment Cars for Portland, Me.

CUMBERLAND COUNTY POWER & LIGHT COMPANY

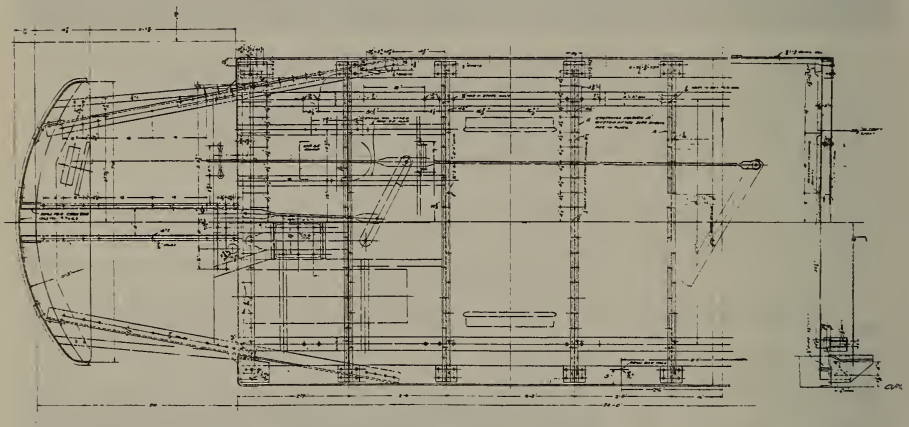
THE Cumberland County Power & Light Company, of Portland, Maine, recently has purchased from the Wason Manufacturing Company, of Springfield, Mass. four 24-ft. prepayment Semi-convertible cars each mounted on a Brill "Radiax" Truck. The cars, as is apparent from their design, are for city service. They were purchased for operation on a line running through a portion of the residential district, the main street of the city and through the wholesale district to the steamship wharves. The new equipment sup-



SEMI-CONVERTIBLE PREPAYMENT CARS FOR PORTLAND, MAINE. Height from track to underside of side sills, 26 in.; height from underside of side sills over trolley boards, 8 ft. 6⅞ in.; height from floor to center of headlining, 7 ft. 7⅞ in.; track to step, 10½ in.; step to platform, 10½ in.; platform to floor, 9½ in.; weight of carbody with electric and airbrake equipment, 18,650 lb.; weight of trucks with motors, 5500 lb.

plants old cars which were not of the prepayment type, and which were smaller and incapable of handling the traffic. The old cars had cross seats, whereas these new cars are equipped with longitudinal seats. The prepayment feature of the new cars (fareboxes are installed on the cars) is one of the big advantages.

Portland has a population of about 60,000. However, the new cars will be operated over a territory serving about 100,000. This is accounted for by the fact that the street railway lines of Portland extend out into the outlying districts, extending to such points as Saco, Old Orchard, on Saco Bay, Cape Elizabeth, Cape Cottage Park, Gorham, Windham and Deering. Still another line extends north along the shores of the beautiful Casco Bay to Yarmouth. At Yarmouth this suburban line connects with the line of the Lewiston, Augusta & Waterville Railroad, which is controlled by the Cumberland County Pr. & Lt. Co., and which connects Yarmouth, Freeport, Bath, Lewiston, Turner, Hacketts Falls, Monmouth, Augusta and Waterville. Portland feels to a very considerable extent the boom of the summer vacation season. All about Portland—especially along Casco Bay—there are scattered summer resorts. These resorts are so popular that in summer the population served by the street railway company (100,000) is increased to 175,000. The effect of this increase in population on the operation of the railway is readily apparent.



SEMI-CONVERTIBLE PREPAYMENT CARS FOR PORTLAND, MAINE. The underframes are of steel and the cars are sheathed in steel up to the window rail. The side posts are of light T-iron, the top plates and side sills of angle-iron and the side sheets, letter board and corner posts of sheet steel

The cars are designed for double-end operation. The terminals in Portland all are loops on the inbound end, but on the out-of-town end about half of them are dead-end, making double-end equipment necessary. Monument Square, in the business district of the city, is the densest traffic point in the city,

and the one through which every route passes. The new cars are to be operated under a schedule which calls for an average rate of speed of seven miles per hour, the stops averaging nine per mile. This speed is maintained on practically all the city lines. On the interurban lines of the Lewiston, Augusta & Waterville the speed averages from twelve to fifteen miles an hour.



SEMI-CONVERTIBLE PREPAYMENT CARS FOR PORTLAND, MAINE. The Semi-convertible window arrangement is one of the best features of the car, especially for the operation upon which the cars are to be used. On this line the summer travel is much heavier than at any other part of the year, and consequently the ready adaptability of the car to this summer work readily is apparent. The sashes raise into pockets in the roof, making the car comfortable and airy and at the same time furnishing instantaneous protection against the elements. There are no bulkhead partitions

Due to the fact that Portland is the northern terminal of the Boston & Maine Railroad, it is the largest distributing point for all of the tourists coming into Maine, New Hampshire and Vermont during the summer season. The company operates two parks, at which are located casinos, where meals are served. These places, along Portland Harbor, specialize in sea food, and a popular diversion is for the people of Portland to ride out to one of these casinos for meals. At each park there is a theater, one an open-air and the other a closed theater.

The company has under its control a total of twenty-five miles of double track and eighty-three miles of single track. For the eleven months ending June 1, 1916, there was carried a total of 22,585,562 passengers, with a total car mileage of 3,720,484. In addition, the company does an extensive freight and express business. Power is generated by the power and light department of the company.

The cars are built on steel underframes and are sheathed in steel up to the window rail, and are designed without bulkheads. The side posts are of light T-iron, the top plates and side sills of angle iron and the side sheets, letter board, and corner posts are of sheet steel. Four-leaf folding doors are provided at the corners of the car. The doors are operated in conjunction with the folding steps.

Inside the cars are finished in natural light mahogany throughout, including the doors, linings and mouldings. The roof is of the Brill Plain Arch Type. The carlines supporting the roof are of white ash reinforced with steel.

Baggage and Express Car for Arkansas Valley Wichita, Kansas

BRILL 27-M. C. B. TRUCKS

FOR use as an electric locomotive, as well as for carrying package freight and express matter, the Arkansas Valley Interurban Railway, of Wichita, Kansas, recently purchased from the American Car Company a 50-ft. baggage and express car mounted on Brill 27-M. C. B. Trucks. Because of the nature of the service for which it will be used, the car is built exceptionally strong so as to stand up. The car will be used on a sixty-mile interurban line connecting such places as Wichita, Valley Center, Sedgwick, Halstead, Newton, Burrton and Hutchinson. The equipment of the company totals fourteen motor and five other cars.



BAGGAGE AND EXPRESS CAR FOR WICHITA, KAN. The car is provided with a sliding door at the center of each side, with an opening of seven feet. These doors are glazed to lighten the interior of the car, the glass protected by window guards. The doors are protected by wooden slat guards which prevent interference with the doors when they are open

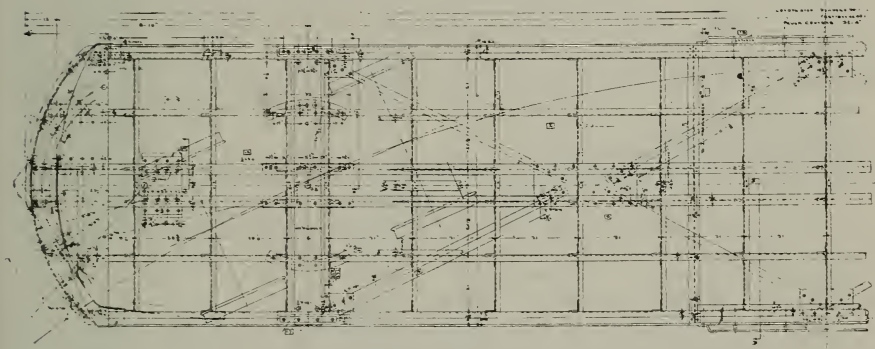
In addition to this baggage and express car, the American Car Company has in course of construction a 56 ft. 2 in. passenger, smoking and baggage car, also mounted on Brill 27-M. C. B. Trucks, which car will be delivered in the near future and will be described in a future issue of BRILL MAGAZINE.

The car is built with straight-grained ash corner, end and side posts, each reinforced with a 5/8 in. rod extending from the top plate to the side sills. Each side sill is trussed with 1½ in. round rods upset at the ends and fitted with twin buckles for adjustment. These truss rods extend from bolster to bolster and are fastened with heavy wrought iron hangers bolted through the bolsters and the side sills. The underframe is of steel throughout, as shown in the accompanying diagram.

The roof of the car is of the Brill Plain Arch type, the carlines of ash, reinforced with 5/8 by 1¼ in.



BAGGAGE AND EXPRESS CAR FOR WICHITA, KAN. This car is for use as an electric locomotive as well as for handling package freight. The operation is an interurban line connecting Wichita with a number of its neighboring towns. In addition to the car shown herewith, the company in the near future will supplement its equipment by the addition of a 56-ft. combination passenger, smoking and baggage car, which now is in course of construction



BAGGAGE AND EXPRESS CAR FOR WICHITA, KAN. Height from track to underside of side sills, 43 in.; height from underside of side sills over trolley boards, 9 ft. 4¾ in.; height from floor under roof, 8 ft. 3¾ in.; weight of carbody, less electrical equipment, 25,000 lb.; weight of trucks, 6400 lb. each, less wheels, axles and gears

forged steel carlines. All the steel carlines have a foot forged at each end and are bolted through to the top plate. The roof is of poplar boards covered with canvas duck in one piece.

At each side of the car in the center there is located a sliding door opening seven feet. These doors have narrow upper openings which are glazed and protected with window guards on the inside. These doors are protected by wooden slats to prevent freight from interfering with the doors when open. Sheet iron protector plates are provided on each side of each sliding door, to guard against injury to the car from careless handling of baggage or freight. The motorman stands in the right-hand corner of the vestibule, and in the left-hand corner of each vestibule there is provided a swinging door, hinged on the corner posts and turning in.

SUGGESTIVE SUBJECTS

Note.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

ACTION

ACTION as contrasted with passiveness—there really can be no more definite contrast! The first brings success, the second a dry rot. How does this apply to your case, do you ask? Think for a minute, with me. Are you making an effort all the time toward attaining the thing toward which you are looking? Are you trying at every turn to make yourself individual, conspicuous for your value to your company? Do you see to it that you lose no chance to be courteous and obliging to your passengers? Do you try to put yourself to a little inconvenience each day in an effort to plant in the minds of your passengers the idea that your company's chief concern is for the comfort of its patrons? Do you help that old woman, this old man, that cripple,—no matter how shabby; the shabbier the better because your courtesy will be all the more noticeable—or do you merely go through your day's routine with none too pleasant an expression on your face, bored with your job and the people who make that job for you (your passengers) and the world in general? Try putting a little punch, a little pep into your work, beginning *now*. Try to build up for yourself a reputation (with your passengers and through them with your company) for courteous, thoughtful, painstaking *service*. It's like bread upon the waters—it'll come back, every crumb of it. Try it once and then try it again and you'll see for yourself.

Get a hobby and ride it hard. One of the biggest pickers of men in the world has said, "Show me what your hobby is and I'll tell you what you might be." A hobby is a developer. Make it the proper kind of a hobby and you'll be sailing along toward better things with your company in jig time.

PESSIMISM

REAMS and reams of articles on the cheerful little optimist and how he's a builder, a constructor, a live-and-let-live sort of chap! And ream after ream of slam-bang-knock-'em-down-again "stuff" on the measly little pessimist and how he's a nuisance, a pest, a danger, a fly in the ointment. Why is it? Because these writer chaps, these penny-a-liners, find that is the stuff that sells. But stop and think a minute. After all, isn't it the chap who has a "dash pessimism" in his makeup who comes nearest to getting the proper slant on "things as they"? We all know the "hip, hip hooray, I'm-optimistic-all-the-time" fool. He's here in huge bundles—each one the same. And as a class we hand him the palm—and the bacon—for common sense! But it's the chap that keeps his enthusiasm within bounds who's usually the do-it-and-forget-to-howl-about-it sort. And, really, isn't he the one that deserves the big applause? There is a great danger in being over optimistic—danger that we may slop over—that we may become unreasonable in finding *too* bright a lining to every cloud. Or, put it differently—there is a real danger in overlooking too completely the dark, threatening side of life and in failing to build up our bulwarks. There is too much of a tendency on the part of these hyper-optimists to place dependence blindly, trustingly in an all-powerful Providence, ignoring the fact that the world of today is a cold-fact, brass-tacks, "Devil-catch-the-hindmost-one" affair. There is a very definite duty we owe to ourselves and those dependent upon us and that is to be up and doing and with such punch as to safeguard our future and the success which should be ours.

Have you been thinking for some time that you wanted something better than your present job of fare-taking or air-braking? All right, get your lines laid. Find out just what it is you want to do and then—commence. Don't wait to get your program entirely mapped out. There are lots of the details that will take care of themselves. The thing you have to do right now is to get STARTED. *Get yourself to the point of at least* THINKING *seriously on what you consider to be the proper outlet for your capabilities.*

It is far better to fail entirely than to sit still and passively rot at your post. Get yourself to thinking about that present job of yours. What are you going to make it give up for you in the way of a future? You are not willing to stay on a platform all your days, are you? Neither will your company be willing to have you stay there if you can convince its officials of your worth elsewhere.

Hard work, earnest thought, plenty of ambition. Well mixed, there's a real dose for the man who would rise.

What is service but obedience in its broadest sense? Do you know how to obey? Are you really sure that you do? All right, keep right ahead obeying—and thinking—and you'll get there.

A BIT OF A JOLT

NOT so long ago I was talking with a conductor chap, a fellow just like yourself,—at least I hope *you* are just like *him*. I started out with the intention of trying to set him *thinking*, and before I got through *he* had *me* thinking. I was talking about opportunities that are used to their fullest extent and opportunities that are cast negligently aside, never to be regained, and I made the mistake (you'll see why it was a mistake) of using that muchly plagiarized, well-worn, albeit generally accepted proverb of striking while the iron is hot. And then I got one of the shocks of my life. "That's all right," said my new-found conductor friend, "for some people, but me, I believe in making the iron hot by striking it." And isn't he right—dead right? Instead of sitting idly on the middle of his spine and waiting for fair opportunity to give him a call, this chap was firmly convinced that the thing for him to do was to get out and hustle and *make* his opportunities! I said that he set me thinking. He did, with a vengeance. And I have done more than just think about his theory. I have watched to see how he would go about putting it to work for him. Apparently he did put it to work, and very apparently it brought home the bacon for him, for yesterday he was missing from his regular car and I discovered that he had been moved up another rung on his ladder to success. And how about you? Do you wait for the iron to be hot to do your striking or are you *keeping* it hot?

The real thing for you to do is to *live* your job. Make your platform work stand out from that of your fellows like a sore thumb.

Always be reaching out for something beyond. Get your lines firmly established, get yourself convinced that you are properly located and then GO AHEAD.

You have got to keep on running nowadays to keep from being dragged down. There are boys right on your heels who are coming along at a fast clip and they are shooting ahead. Will you let them shoot ahead of you? Will you make and keep yourself recognized as the logical candidate for the next position requiring the services of a *good* platform man? Think it over. Think.

Never be satisfied with yourself. When a man begins to think that he's pretty close to perfection you may be sure that he is stepping backward. It is to your company's advantage for you to step ahead. Isn't it easy to see that everything possible will be done to aid you in your forward progress?

GOOD OLD BASEBALL DAYS

DO you remember the little fellow with whom you used to play ball on the corner lot? Remember how he scarcely had sense enough to come in out of the rain? And you know where he is now, don't you—passing down orders to you? In those corner-lot days you wouldn't have stood for him holding down the reputation of being "better with the club" than you, would you? No, you would have fought to a fare-you-well to get ahead of him with your trusty twenty-five cent bat. What has made the change? He's up there ahead of you, there's no denying that. But are you willing to have him lead you always? Take a running jump and get yourself under way. He couldn't beat you at baseball, could he? Why should he work his way out of his platform job and leave you standing still? No reason, unless you have lost your spunk, your self-pride. Hustle up there and see if you can't leave him standing still. He got his promotion from the same job you have now, didn't he? Well, then, is it hard to convince yourself that promotions are to be had?

When you honestly are convinced you're worth more money than you're getting, ask for it and GET it.

Spare moments are the most valuable things you can have. What are you doing with yours? Do you use each one in getting next to something that is going to give you a better job than your present one?

The successful man is he who makes his habit of winning last a lifetime. Most any sort of a fool can win once—if he plugs along at his trying long enough. It's winning all the time that counts. But—you—are you even plugging all the time? What do you think is ahead of that job of yours? Your company doesn't want you to stand still. The sooner you are capable of holding down a better post the better it will like it—and you.

SMILE

SMILE—first, last and all the time. Success did not put the smile on that big man's face. The man put the smile there first of all and then the smile habit brought the success. Don't grouch *ever*. The grouch seldom makes anything of himself but a failure and of his associates he makes nothing but enemies. Nobody likes a grouch nowadays—there are too many smiling men. Do you think the man with the grouch or the man with the smile will make more impression (favorable impression) upon the passengers who spell failure or success for your company? Try to make everyone of your passengers feel that they are getting cheerful, good, courteous service. And don't just grin—*smile*. Really mean it. It'll do good things for you.

Don't be an excuse-maker. If something goes wrong, buck up like a man and take your SHARE *of the blame. You'll be better liked for that than if you have an* EXCUSE *ready to go to work for you. The man who is willing to admit that he started his car too soon, or failed to see a passenger, or forgot to do any one of his routine jobs is big enough to profit by his mistake and wise enough to guard against a repetition of it. Your company realizes this fact and appreciates the value to it of having such a scheme of living wrapped up in you.*

How's your temper? Self-control is one of the first things a big man investigates in an employe he is thinking of promoting. Don't get the reputation of being prone to "fly off the handle." There can be no better way of hurting your company with its passengers and, consequently, yourself.

Someone once said that there are three classes of men—mind-workers, machine-workers and won't-workers. Honestly, now, to which class do you belong? If you're still in the second class have you laid your plans for stepping up into the first class?

BRILL RENITENT POST



RATTLE-PROOF, water-tight, safe against glass breakage from careless handling and against injury to passengers' hands and arms from sudden dropping should the catches fail; easily removable without the use of tools and interchangeable from window to window—those are among the chief advantages that accrue to users of the Brill Renitent Post —which, incidentally, are very numerous. The post is a new invention, but already it has earned a reputation for itself and has found tremendous favor throughout the electric railway field.

THE J. G. BRILL COMPANY

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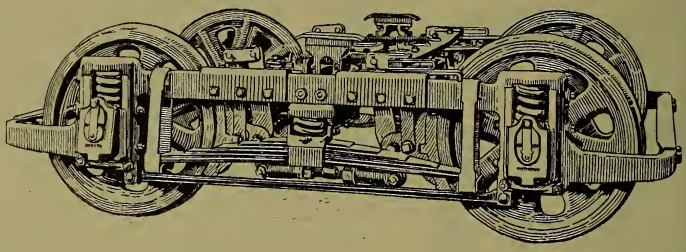
ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

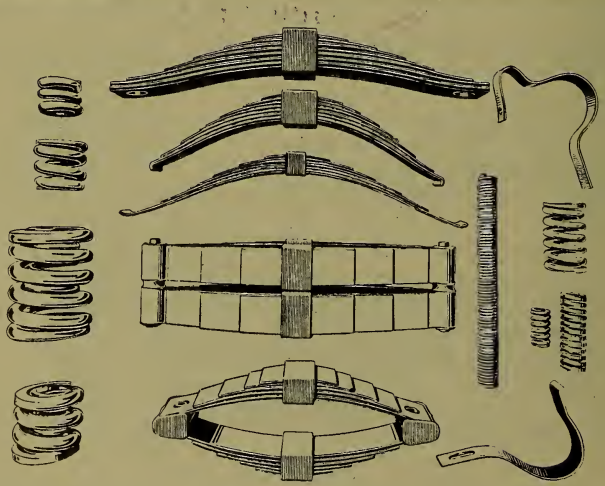
ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

THE BRILL 77-E TRUCK



THIS truck is very similar in design to the ever-popular Brill 39-E Truck, which has scored such a success for city service. The spring arrangement is identical. The chief point of difference between the 77-E and the 39-E is that the former has two motors, whereas the latter has but one. The adaptability of the 77-E, therefore, to city operations where the grades are somewhat heavy for the single motor 39-E is very plainly seen. The 77-E is identical with the 76-E except that it has inside-hung motors, whereas the motors of the latter are outside hung.



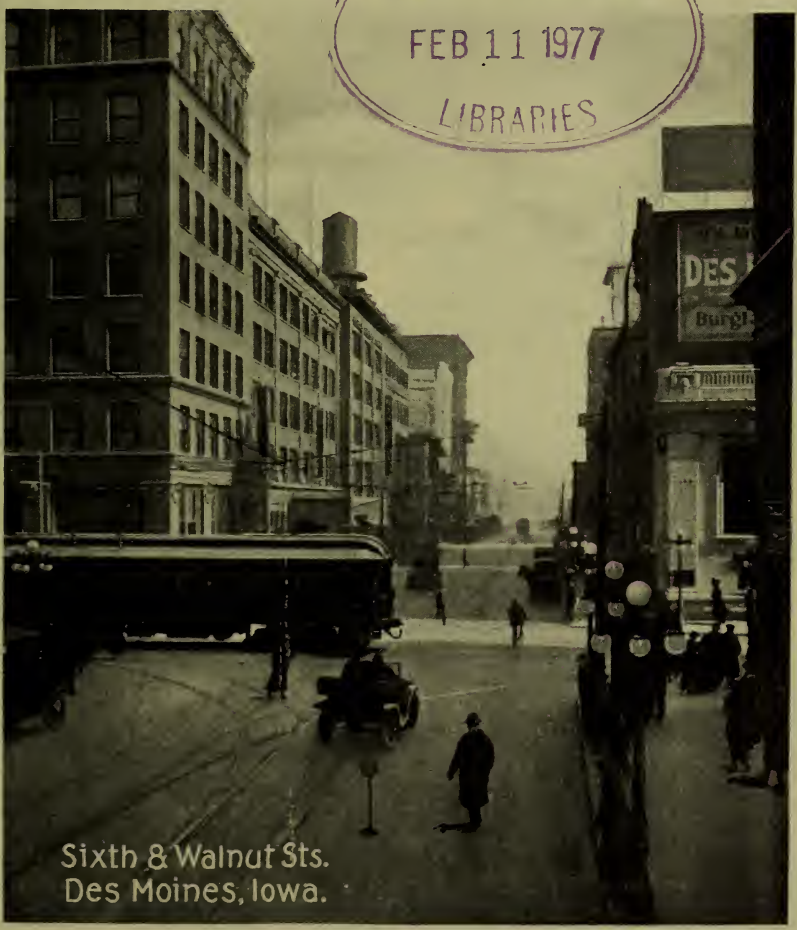
BRILL Springs are made of the finest grade of high-carbon, low-phosphorus steel and each spring is accurately tested. They are made to give service—and they do.

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VOL. 11 MAY, 1917 NO. 5

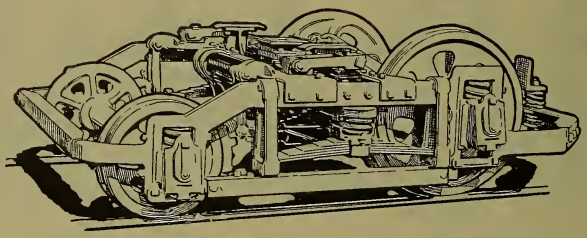
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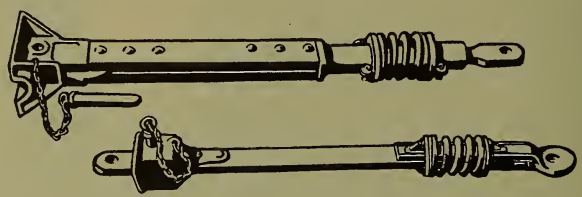
Sixth & Walnut Sts.
Des Moines, Iowa.

BRILL 39-E TRUCK



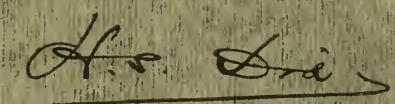
FOR a long time the Brill 39-E Truck has remained the standard single-motor truck, its lightness in weight, its "Half-ball" Brake Hangers, its Graduated Spring System and its solid-forged sideframes all contributing to the success of the truck and forming in combination an efficiency of design which is responsible for the favor the truck has maintained for itself in the electric railway field. The Graduated Spring System, acting in combination with the Brill Bolster Guide, furnishes a smoothness which is most welcome to the riding public, good spring action being furnished the car under all loads, light or heavy

BRILL RADIAL DRAWBAR



THE description of this drawbar as "self-contained" is a very apt one, there being absolutely no loose parts about the bar to be repaired or replaced. The single spring used is arranged on the bar so that it performs the double function of draw and recoil. The larger, channel-iron bar is used for cars of more than thirty feet in length and the smaller bar is used for cars of shorter dimensions.





ENGINEER AND MANAGER, PRAHRAN AND MALVERN TRAMWAYS TRUST.
VICTORIA, AUSTRALIA.

MANHOOD

Manhood—what is it?

Is it merely twenty-one years piled end on end?

Is it the privilege to walk into a polling booth and cast our "yes" or "no" into the melting pot that means the management of our government?

Is it acquisition of titles—riches—power?

Is it fame?

No; none of these alone, but rather a certain undeniable quality that dictates to us our proper attitude toward women, our proper attitude toward society and civilization. It is the quality that brings us up on our toes, fists clinched and eyes ablaze at an unjustifiable wrong—not at a mistake but at an intentional wrong. It is the thing within us that sends red-blooded thrills chasing each other up and down our spines at the sight of the flag for which we stand and which stands for us, and at the sound of the beloved anthem which carried our forebears through more than one fiery furnace. Manhood, somehow or other, stands at our side in a tight place and tells us where to go and where not to go and when to strike and when to turn the other cheek.

It is the backbone of humanity, the thing upon which civilization must depend for its salvation and permanent state of being.

BRILL MAGAZINE

VOL. 11—NO. 5 Copyright, 1917, by The J. G. Brill Company, Philadelphia, U. S. A. MAY 15, 1917

HARRY SIDNEY DIX

HARRY SIDNEY DIX, engineer and manager Prahran and Malvern Tramways Trust, Victoria, Australia, was born at Weybridge, Surrey, England, in 1871. He received his education at the Kendrick School, Reading. In 1888 he was apprenticed to the Scientific Appliance Manufacturing Company, Hatton Garden, London, and subsequently he spent one year in the marine and general engineering shop of E. Lancaster & Company, Southampton. In 1894 he was appointed shift engineer in the Bournemouth electrical station of the County of London and Brush Provincial Electric Lighting Company. In 1896 he joined the Sheffield Electric Light & Power Company as assistant engineer, being located at the company's generating station at Pond Street, Sheffield. Mr. Dix's first connection with traction work was in 1900, when he went to Colombo, Ceylon, with the United Planters Company of Ceylon, now the Colombo Electric Tramways & Lighting Company. In October, 1908, he was appointed engineer to the Prahran & Malvern Tramways Trust, to supervise the construction of a system of tramways, of which he is at the present time the engineer and manager. This system of tramways is the pioneer of municipal tramways in Victoria, having been inaugurated in 1910. Originally it was designed as a connection between Prahran and Malvern, but it has expanded so as to include seven municipalities—Prahran, Malvern, St. Kilda, Caulfield, Hawthorn, Kew and Camberwell, whose total population is about 125,500. In the last six years, under the able guidance of Mr. Dix, the annual traffic receipts have grown from about $100,000 to about $600,000 and the trackage from four and one-half miles to about thirty miles. Altogether the Trust operates about eighty-three cars, the majority of which are mounted on single trucks, twenty-five of the number being mounted on maximum traction trucks. The design of these twenty-five double-truck cars was perfected in Mr. Dix's office, being a development of the center-entrance type of car, which is well adapted to Australian conditions.

Interurban Centers and Interurban Cars

DES MOINES, IOWA



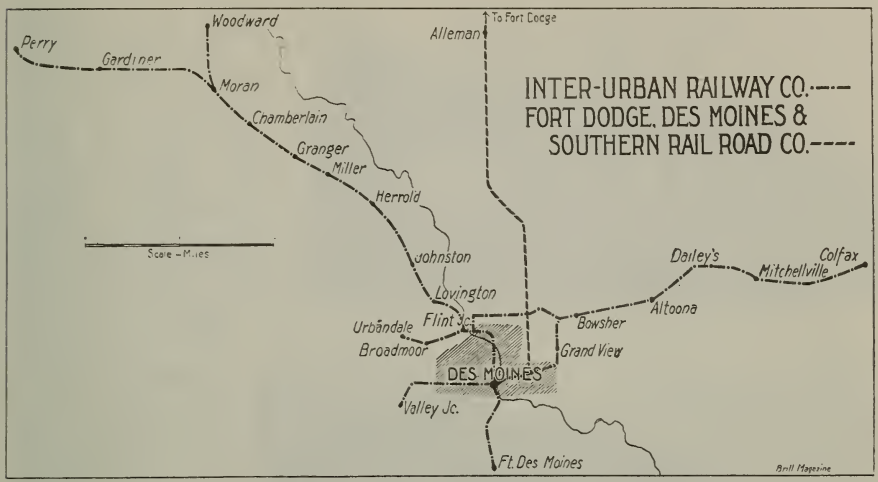
DES MOINES, capital and largest city of Iowa and the county-seat of Polk County, is located in the south-central part of the state, at the confluence of the Raccoon and the Des Moines Rivers. Its population in 1910 was 86,368. In addition to its interurban electric system, Des Moines is served by nineteen important steam lines, which fact of course has its effect upon the progress of the city.

The city is of considerable importance as a manufacturing center. Among its leading products are those of the furnaces, foundries and machine shops, flour and grist mills, planing mills, creameries, bridge and iron works and packing houses. The city is located in one of the most productive coal regions in the state, has a considerable jobbing trade and is an important center for the insurance business.

A fort called Des Moines was established on the site of the city in 1843. In this same year the site was opened to settlement by the



Interurban Centers and Cars. Jobbing District from Seventh Street Viaduct, Des Moines



whites. In 1851 Des Moines was incorporated as a town and in 1857 it received its first charter as a city. In that same year, for the sake of a more central location, the seat of government was moved to Des Moines from Iowa City.

In 1900 a fort was re-established by an act of Congress and was named Fort Des Moines. This fort is occupied by a regiment of cavalry. The park system of the city is extensive, comprising 750 acres. Five colleges are located at Des Moines, including Des Moines College, Drake University, Highland Park College, Grand View College and Capital City Commercial College.

A good idea of the nature of the country surrounding Des Moines may be had from the fact that Iowa is one of the richest agricultural states in the country. Its annual corn crop is greater in value than all the wheat raised in either Canada or the Argentine Republic and it is also worth more than the annual yield of either iron ore, anthracite coal, petroleum products, or the products of all the gold, silver, or copper mines in the United States. The apple crop of Iowa is outranked in value only by that of the states of New York, Pennsylvania, Michigan and Missouri. In fact, the orchard products of the state of Iowa are greater in value than those of any Pacific coast state. Comparatively recent statistics show that the farms of Iowa are worth more than the farms of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, West Virginia, South Carolina, Florida, Alabama, Arizona, Utah, Nevada, New Mexico, Montana and Wyoming all combined—a total representing the farm land of nineteen states. During the last ten years the farm lands in Iowa have increased close to $60 per acre. With the exception of New Jersey, Ohio, Indiana, Illi-

nois and California this increase alone amounts to more than the average value per acre of the farm land of every other state in the Union. Ten counties alone in the state of Iowa annually produce corn, oats, wheat and barley crops which are worth more than the cereal and potato crops of thirty-two other American states.

Despite the fact that Iowa ranks twenty-third among the states in area of land and not very much higher in population, she leads all the other states in total value of farm products, livestock, farm property per farm, increased value of farm property during a decade, percentage of farm land improved, percentage of total area in farms, number of automobiles per capita, value of horses, hogs, poultry, egg production, farm implements, forage crops, oats, and grass seed.



Interurban Centers and Cars. Municipal Building, Des Moines

The present population of Des Moines is close to 110,000. The city covers fifty-four square miles. The city has sixty public school buildings and twelve universities, colleges, and special schools. In the city there are about 400 factories with an average of 6000 employees each. Geographically the city is well located, it being possible for more than 20,000,000 people to leave home in the evening and arrive in Des Moines the next morning. Capital is made of this advantageous location by the business men of the city, who take advantage of every opportunity to draw conventions there.

The interurban systems serving the city play an important part in its prosperity. Each day the interurbans bring more than 2500 shoppers into Des Moines and they link the city in hourly communication with a total of 320,000 people. This interurban system is made up of the lines of the Fort Dodge, Des Moines & Southern Railroad and the Interurban Railway, both of whose operations are indicated on the accompanying map.

The distance between Fort Dodge and Des Moines is about 87 miles, and on this line schedules are maintained at a high pitch, the speed averaging 44 miles per hour and the stops numbering about one to the mile. Two types of cars

used for this interurban operation are shown on page 138. The shorter center-entrance car is used between Boone and Ames, a distance of about 21 miles, and the larger car is used over the whole run from Fort Dodge to Des Moines.



Interurban Centers and Cars. Freight House, Des Moines

The principal cities served are Fort Dodge (20,000), located at the northern terminus; Boone (12,000), 43 miles south of Fort Dodge; Ames (6000), the terminus of a branch line; and Des Moines.

The operation very closely resembles that of the average steam railroad. The cars of the company enter Des Moines over the Rock Island tracks and the company uses the Rock Island station. In Fort Dodge, the other extremity of the system, the cars are looped. The road-bed is ballasted with gravel and the line is single track throughout.

The company handles commercial baggage in much the same manner as steam railroads, it being a rule of the company that passengers cannot ride in the baggage compartment. This operation is one of the most striking examples of the value to an interurban railway company of building up a heavy freight traffic, practically 60 per cent. of the earnings of the company being derived from freight. It has been said that this company is the heaviest freight carrying interurban electric railway in the country. This is easily accounted for by the nature of the cities served by the operation, Boone being a heavy producer of coal and Fort Dodge being the largest producer of gypsum and gypsum products in the West.

The company generates its own



Interurban Centers and Cars. Interurban car serving Des Moines, Altoona, Mitchellville and Colfax



Interurban Centers and Cars. Freight switching yard of Company

power at Fraser, Iowa, which is a short distance above Boone. The two cars shown on page 138, built by the American Car Company, are standard with the company. The center-entrance car measures 42 ft. 2 in. over the bumpers, 32 ft. 2 in. in the main passenger compartment, and 9 ft. in the baggage compartment. It measures 9 ft. 10 in. over the side sheathing. The car has a seating capacity of 36, a carbody weight without electrical equipment of 24,000 pounds, and a total weight for the two trucks of 21,840 pounds. The larger car measures 55 ft. 6¾ in. over the bumpers, 12 ft. 2 in. in the baggage compartment, 10 ft. 8 in. in the smoking compartment, and 27 ft. 8¼ in. in the main passenger compartment. It has a seating capacity of 54, a weight of carbody without electrical equipment of 30,000 pounds, and a weight of the two trucks of 22,560 pounds.

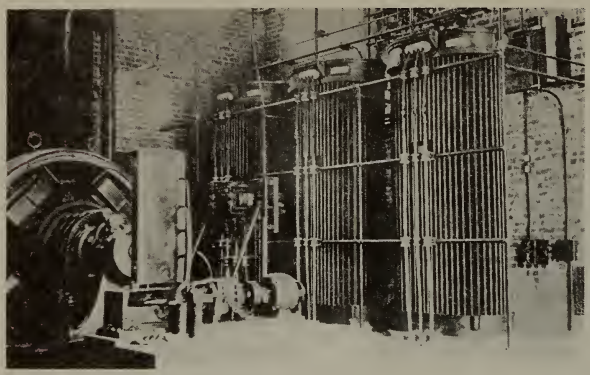
The Interurban Railway Company is indicated in its entirety on the map appearing on page 131. This company is affiliated with the Des Moines City Railway Company, from which it purchases all its power used in the operation of the system. The operation serves such towns as Perry (6000); Woodward (1200); Colfax (2500); Mitchellville (1200); Altoona (800); Granger (400). All together the company serves a total tributary population estimated at 200,000. It operates 59 miles of single track, 3 miles of double track, and 19 miles of sidings and yards.

At Des Moines the company has direct physical connection with the Chicago Great Western Railroad, the Chicago Northwestern Railroad, the Chicago, Rock Island & Pacific Railroad, and the Fort Dodge, Des Moines & Southern, whose operation already has been described. The company also connects through the Iowa Transfer, which is the distributing transfer for both road haul and cars to and from the switching district in Des Moines, with the Chicago, Burlington & Quincy Railroad, the Milwaukee & St. Paul Railroad, the Wabash Railroad, the Minneapolis & St. Louis Railroad, the Des Moines Union Railroad Company, and the Des Moines & Western Railway. At Perry, Iowa, the company makes direct connection with the Minneapolis & St. Louis Railroad and with the Chicago, Milwaukee & St. Paul Railroad, using the Minneapolis & St. Louis Railroad as an intermediate line. At Woodward, Iowa, the company makes direct connection with the Chicago, Milwaukee & St. Paul Railroad. At Altoona connection is made with the Chicago, Rock Island & Pacific Railroad, and at Colfax with the Colfax Northern Railway Company and with the Chicago, Rock Island & Pacific Railroad.

The power used in the operation of the company's lines is transmitted at 22,000 volts, which voltage is stepped down to a line voltage of 650, sub-stations being located as follows: Colfax Division, Bowsher, Mitchellville; Beaver Valley Division, Flint Junction, Brennan, Hyperion, Herrold, Moran and Perry. Two of these sub-stations—the one located at



INTERURBAN CENTERS AND CARS. Electric locomotive and freight train in use on Company's line



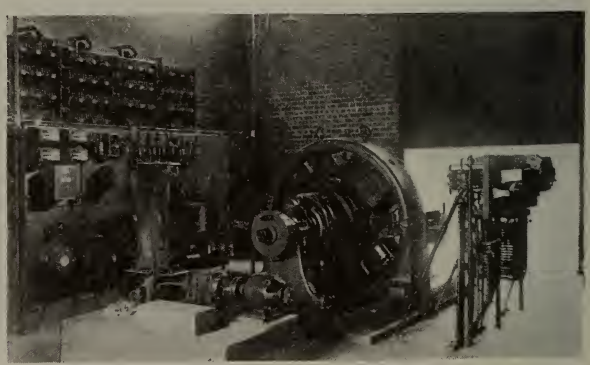
Interurban Centers and Cars. Automatic substations

Brennan and the other at Hyperion—are of comparatively recent construction and they are automatic controlled.

The power installation of the Des Moines City Railway is one of the most interesting in the country, being the first example of the application of the automatic substation to an entire city property. The principle of the automatic sub-station consists of the utilization of the variations in line voltage to control the starting and stopping of rotary converters. The installation controls the complete operation of the Des Moines city lines from the automatic sub-stations and the supplying of power to the Interurban Railway at points in between the original sub-stations of the company, thus providing for the very heavy freight traffic and eliminating the excessive line drop.

One of the principal features of the automatic sub-station is the economic possibility of locating stations where the power is needed most. In Des Moines practically all the cars pass through the downtown district, and consequently the power requirements in this district are very great. Under the new plan a sub-station is placed at either end of the loop and the line losses are cut down so materially that the trolley wire provides ample copper for the transmission of power and all feeder copper has been removed.

Comparatively recently a gravel pit was opened on the banks of the Des Moines River north of Herrold and a spur two miles long was built to it so as to permit the hauling of from 20 to 40 cars of gravel per day, this gravel being



Interurban Centers and Cars. Automatic equipment in Twelfth and High Streets substations. Des Moines City Railway

delivered to the Chicago Great Western Railroad at Highland Junction on the belt line north of the city. This gravel haul, along with the other freight haul and the heavy grades and curves on the spur to the gravel pit and between Herrold and Beaver Valley Junction, cause a very excessive drop in voltage, and to provide suitable power supply for this heavy freight hauling two 300-kw. automatic sub-stations were installed at Brennan and Hyperion on the nine-mile run between Beaver Valley Junction and Herrold. These two sub-stations are spaced so that the distance from Beaver Valley Junction to Brennan is 3 7-10 miles, between Brennan and Hyperion 2 7-10 miles, and between Hyperion and Herrold 2 3-10 miles. In addition there is a portable sub-station which is completely equipped to be used on either the 22,000-volt interurban line or the 4400-volt lines in the city, it being possible to change over from one to the other within a few hours.



Interurban Centers and Cars. Standard substation on lines of Company

At the company's other sub-stations,—Perry, Moran, Herrold, Bowsher and Mitchellville,—the day operator also acts as station, ticket and freight agent, handling train orders, etc. As these other duties require the services of a man anyway, the stations will be continued under manual operation for the present. However, as the business grows and the combined duties become too great for one man to handle efficiently, automatic control equipment will be put in.

Most of the car equipment of this system is of the two-compartment type, built for single-end operation, and having a seating capacity in the main compartment for fifty passengers. These cars are 52 ft. long over the vestibule, 54 ft. over the bumpers, 8 ft. 4 in. over the side sheathing, and 27 ft. between the centers of bolsters. All the cars are of wooden construction, and have a carbody weight, including brake and electrical equipment, of 55,000 pounds, the total weight of car and trucks fully equipped being 77,500 pounds.

The cars are operated singly, but are equipped with multiple unit control, making it possible to use them for train service. They are mounted on Brill Trucks, equipped with four 75 H. P. motors. Normally the company uses six passenger cars for the operation of the schedules, but it has a total of



INTERURBAN CENTERS AND CARS. This car was built for the Fort Dodge, Des Moines & Southern Railroad Co., whose operation is described in the accompanying article, by the American Car Company, in 1916, and described in detail in the article appearing in BRILL MAGAZINE in January of that year. The car is being used on the Company's lines between Boone and Ames

eight cars available for service. Outside of the city the lines are built on private right-of-way exclusively. The number of stops average five to the mile and the maximum speed is about 35 miles per hour.

The company does a general freight business on much the same order as any of the steam trunk lines, having ample facilities for both carload and less than carload freight. Through rates and divisions are maintained with all the lines with which the company connects. The Wells-Fargo Express business forms another important feature of the company's operation. Special attention is called to an article which was published in BRILL MAGAZINE for January, 1916.



INTERURBAN CENTERS AND CARS. This car, built at the same time as the center-entrance car appearing at the top of this page, is being used by the Fort Dodge, Des Moines & Southern Railroad Company on the main line beween Fort Dodge and Des Moines. The car is designed for high-speed service and with it the company is able to maintain an average speed of 44 miles per hour, which is very creditable

18-Ft. Cars for Jackson, Tennessee

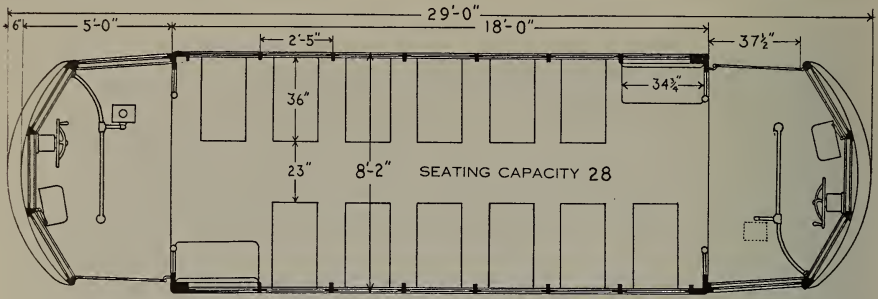
TWELVE-YEAR OLD BRILL 21-E TRUCKS USED

THE Jackson Railway and Light Company, of Jackson, Tennessee, recently has received from the American Car Company two 18-ft closed cars, as illustrated herewith. These cars are designed for use with the Brill 21-E Truck. They were built complete without trucks and shipped to their destination, where they were mounted on two Brill 21-E's that were sold to the Jackson & Suburban Street Railroad Company by the John Stephenson Company, a Brill subsidiary, in 1905. This fact surely is eloquent evidence of the stamina of Brill trucks and the efficiency of their design, which bolsters them up against the hardest sort of service and makes for longevity of life.

The Brill 21-E Truck successfully has stood up against the sharpest sort of competition for a long time, its design being ideal. The general spring arrangement of the Brill 21-E has been followed by nearly all truck builders. However, the particular system used in the 21-E provides for carrying the car two inches lower to the ground than does any other truck. This reduction in height above the track is a very obvious and important advantage. Single trucks are used for the most part in city service and reducing the height of the truck means reducing the height of the car steps, which of course saves time taken in boarding and alighting and lessens the chances of accidents. The spring base of



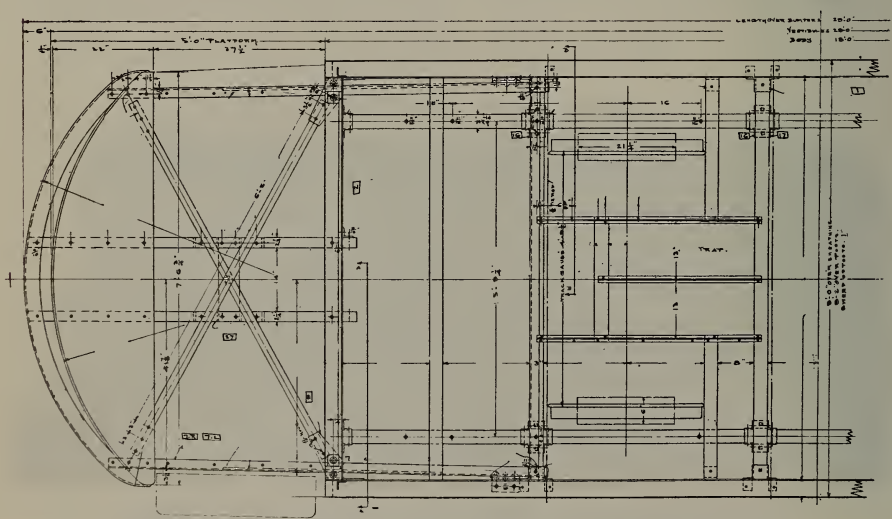
18-Ft. Cars for Jackson, Tenn. These cars were shipped without trucks, it being the intention of the company purchasing them to mount them upon Brill 21-E Trucks which were purchased from the John Stephenson Company, a Brill subsidiary, in 1905. This alone should indicate the ability of the 21-E to stand up under service



18-FT. CARS FOR JACKSON, TENN. Height from track to underside of side sills, 27¼ in.; height from underside of side sills over trolley boards, 8 ft. 11 in.; height from floor to center of headlining, 7 ft. 11¼ in.; track to step, $13\frac{13}{16}$ in.; step to platform, 12½ in.; platform to floor, $7\frac{13}{16}$ in.; weight of carbody, 11,000 lb.

the truck is lengthened out by the position of the semi-elliptics and thus a steady and easy support is given the car. Also, the spring-base of the truck frame is increased by the use of Brill Wide-wing Journal Boxes, thus giving even greater ease in riding. Stress in the truck frame is reduced by the wide-wing journal boxes supporting the frame directly under the body coil springs.

Jackson is a city of close to 20,000 population, its 1910 census returns having displayed a total of 15,779. The Jackson Railway and Light Company, for whom these new carbodies were built, is the successor of the Jackson & Suburban Street Railroad Company. The new company connects Jackson with Hicksville. The company



18-FT. CARS FOR JACKSON, TENN. The side sills are of wood plated with steel plates and the end sills and center cross joists are of oak. The corner and side posts are 1½ in. thick

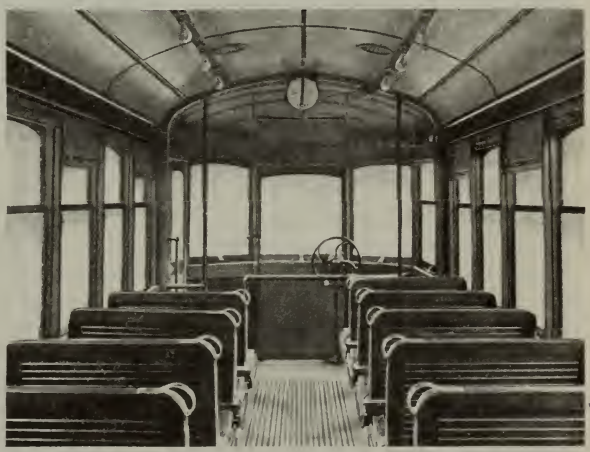
does a general lighting and power business in addition to its operation of about fifteen miles of track. It owns and operates a total of about 25 cars.

In the underframes side sills of wood, 3½ by 7½ in. plated on the inside with ⅜ by 12 in. steel plates, are used. The end sills are of oak, 2½ by 4 1-16 in., and the center cross joists also are of oak, of the same section. All mortises and tenons are thoroughly white leaded and driven together and fastened together by tie rods of refined iron. The flooring is of narrow yellow pine, topped with maple floor mats which are tapered and extend the full length of the car, with the exception of a space 2 in. wide at each end to allow for sweeping the car. In the body framing the corner and side posts both are 1½ in. thick.

The roof is of the Brill Plain Arch type, extending the full length of the car and strengthened with concealed steel rafters, 1¼ in. by ¼ in. These rafters are forged to the shape of the roof in a solid piece with a foot at each end, which foot is bolted to the top rail. There are seven windows on each side of the car, the window heads arched and the top sash made stationary and in one piece the full length of the car. The lower sash in each window is arranged to raise. The platforms are equipped with an opening and step at the left of the motorman at each end of the car and the right side of the platform is closed up and is equipped with a large sash arranged to raise the same as the other windows in the car.

The cars are equipped with Brill Angle-iron Bumpers supported on knees extended for this purpose. The bumper extends from one side to the other and projects beyond the crown. Each end of the car is fitted with a sheet steel bumper shield. The drawbars are of the Brill type, equipped with double-acting (draw and recoil) springs. Brill Dedenda gongs are provided on each platform. Also, Brill patented signal bells are used.

The seats are of cherry to match the interior finish of the car. The seats are arranged for 28 persons.

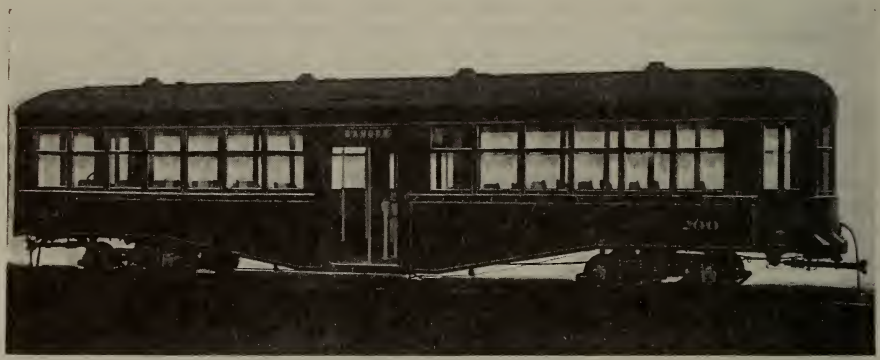


18-FT. CARS FOR JACKSON, TENN. These cars are typical single-truck, light-weight cars, many designs of which are so popular nowadays because of the tendency of the electric railway field toward power-saving, economical equipment

Center Entrance Trail Car for Bangor Railway and Electric Co.

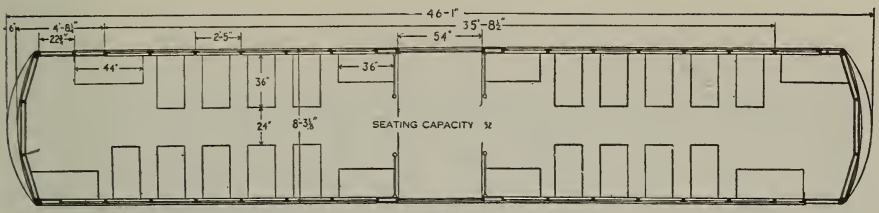
BRILL 77-E TRUCK

THE J. G. Brill Company recently delivered to the Bangor Railway and Electric Company, of Bangor, Maine, a 45-ft. closed center-entrance trail car mounted on Brill 77-E trucks. This company is a result of the consolidation of several companies, including the Bangor, Orono & Old Town Railway Co., the Bangor, Hampden & Winterport Railway, the Old Town Electric Company, Public Works Company, Penobscot Water and Power Company, Brewer Water Company and the Bangor and Northern Railroad Company. The company, through stock ownership, controls the Bangor Power Company, The Bar Harbor and Union River Power Company and the Orono Water Company. The lines of the company connect Bangor with Brewer, Old Town, Orono, Veazie, Milford, Hampden, Kenduskea, Corinth and Charlestown. Altogether, the trackage of the company totals about 66 miles and the company operates about 75 cars. It does also a general lighting business in Bangor and vicinity.



CENTER ENTRANCE TRAILER FOR BANGOR, MAINE. The Brill Renitent Window System is an important part of the design of the car. This system combines the advantages of the sash being water-tight, rattle-proof, easily removable without the use of tools, interchangeable from window to window and from car to car, safe from glass breakage as the result of careless handling and safe from being disturbed by wind pressure or by the casual pressure exerted upon it by a passenger raising or lowering it

The cars are built upon underframes in which the side sills are of 5 by 3½ in. angle with the long leg laid horizontal. This side sill is reinforced at the bolster with a suitable angle to relieve the strain on the horizontal leg. Well sills are of pressed steel, as are also the crossings, which latter are riveted

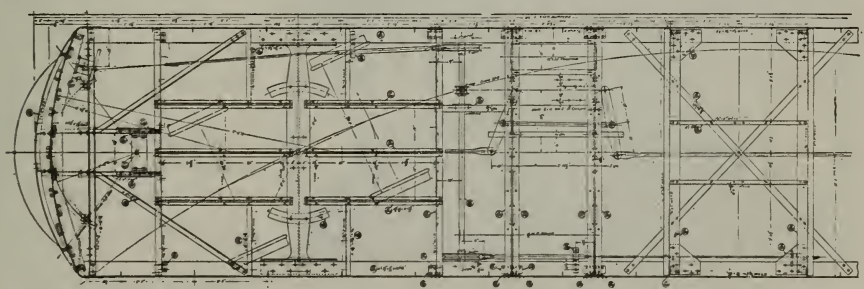


CENTER ENTRANCE TRAILER FOR BANGOR, MAINE. The side sills are of angle, the bolsters of cast steel, the crossings and well sills of pressed steel and the center platform knees of channel. The bumpers also are of channel

to the side sills through the lower flange. The bolsters are of cast steel bolted to the side sills and to the reinforcing angles and made with suitable openings for the passage of brake rods. The center platform knees are of 4 in. channel extending from the end sill to the inside of the bumper channel. This bumper channel is of 6 in. metal extending the full width of the vestibule and projecting 6 in. from the face of the vestibule. The vestibule posts are of 2 by 1½ by ¼ to 5-16 in. tees filled with wood which is grooved to form runs for the sashes.

In the body framing the side posts are of 1½ by 2 in. by 3-16 to ¼ in. tees extending from the side sill to the top rail and riveted to them both. The belt rail is of 3 by ½ in. steel, covered with pressed steel window sill capping extending down 2¼ in. on the outside of the belt rail. The top rail is of 2½ by 2½ in. angle extending the full length of the car and riveted to the top of each side post. The letter board is of sheet steel, the lower edge pressed to form a drip moulding. At each post there is a 1¼ by 1½ in. filler between the letter board and the T-post. The vestibule belt rail is of 3 by 3-16 in. steel bar. The side sheathing of the car is of sheet steel in three sections and the seat rail angles are of 3 by 2 in. angle riveted to the side sheets so as to form a proper support for the seats.

The roof is of the Brill Plain Arch type strengthened with con-



CENTER ENTRANCE CARS FOR BANGOR, MAINE. Height from track to underside of side sills at bolster, 2 ft. 4 in.; track to floor, 15 in.; platform to floor, 10 in.; floor ramp to center of car, 5 in.; weight of trucks, 9700 lb.; weight of car complete with trucks and air equipment, 27,100 lb.

cealed steel rafters of U-shape which extend the full width of the roof between the top rails and which are provided with projecting flanges on each side. Inside of each rafter there is a wooden strip to which the roof boards are fastened.

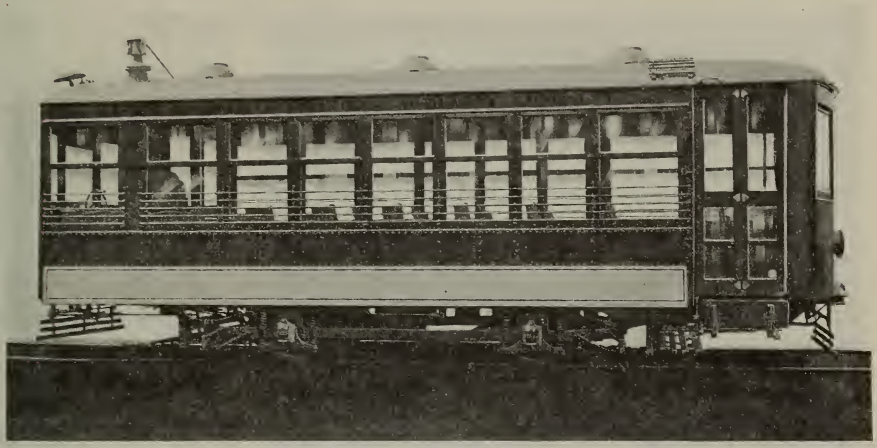
There are thirteen windows on each side of the car, the window heads built straight and the windows provided with double sash, the lower sash arranged to raise vertically and the upper sash made continuous the full length of each compartment of the car, being interrupted by the center entrance. The top of this upper sash is held in place by the water table on the bottom of the letterboard and the bottom is held by malleable clips which are riveted to the T-posts.

The cars are equipped with the new Brill Renitent Post Window System, a system in which the metal sash stiles slide in spring bronze casings. This Renitent Post system, despite its comparatively recent introduction to the electric railway field, has created a most favorable impression and is being used in a very large number of places. The sash has the advantages of being water-tight, rattle-proof, easily removable without tools, interchangeable, safe from sudden dropping should the catches fail and safe from glass breakage resulting from careless handling. Despite the fact that the sash may be removed without the use of tools, by the exertion of a pressure which is not extraordinarily great, it cannot be disturbed by the casual pressure exerted by a passenger raising or lowering the window.

The brass casing is fastened to the T-post by means of a stirrup and clip arrangement. This is an added advantage because in case of accident the T-post is readily accessible for repair and it also is accessible for inspection at any time. A Brill bulletin — No. 229 — goes into greater detail on the construction of the post, its uses, etc., and gives a list of companies which are using it. Officials of these companies are expressing the greatest satisfaction with the post and no doubt would be glad to tell of their experience.



Center Entrance Trailer for Bangor, Maine. This car, built by The J. G. Brill Company, will be used on the company's operation connecting such places as Bangor, Brewer, Old Town, Milford, Hampden, Corinth and Charleston



SINGLE-TRUCK CAR FOR OMAHA, LINCOLN AND BEATRICE. This car is for use on a new line which, when it is completed, will total something close to 56 miles of track and will connect Lincoln and Omaha. At present the company has in operation about eight miles of track

Single-Truck Car for Omaha, Lincoln and Beatrice Railway

BRILL 21-E TRUCK

THE Omaha, Lincoln and Beatrice Railway Company, of Lincoln, Nebraska, a city whose 1915 census returns showed a total population of about 52,000, recently received from the American Car Company, of St. Louis, a short (17 ft. 9½ in.) closed motor car mounted on a Brill 21-E Truck. Up to date this company has about eight miles of track completed and in operation, with a total of about five cars. However, the projected construction of the company totals about 56 miles of track. When its lines are completed the company will connect University Place, Bethany and Lincoln (which three places it now serves) with Omaha, South Omaha, Papillion, Springfield, Ashland, Greenwood and Waverly District. The company, for the present at least, will purchase its power from the Lincoln Traction Company.

The underframe upon which the car is built includes side sills of 3 by 3 in. angle, cross sills of 3 in. 4 lb. channel, dasher angles 1½ by 1½ by ⅛ in., seat rest angles 1¼ by 1¼ by ⅛ in. and window rests of sheet steel. The center platform sills at the ends are of 3 in. channel and the outside platform knees are of 6 in. 8 lb. channel, the crown pieces being of oak.

In the body framing the corner posts are 1¼ by ¾ by 1⅛ in. angle reinforced with oak and the side posts are 1½ by 1½ in. tees.

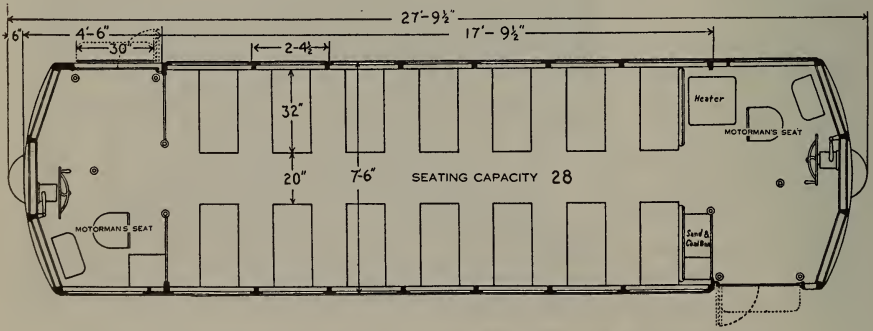
The side plates are of sheet steel, as are also the dasher and the buffer shields. The side, door and finish are cherry.

The side sills angles are made in one continuous piece extending from the body corner post to the vestibule corner post. The cross sills are joined to the side sill angles and are reinforced at the truck bearings with 1½ by 3 in. angle.

The dasher angles are riveted to the side sill angles with gusset plates. The cross sills are fastened to the side sills and the dasher angles in the same manner. The seat angles and window rest plates are machine fitted to the posts and riveted. The crown pieces are bolted to the sills. The letter boards are made in not more than three pieces jointed together with splice plates which are riveted to the tee posts and are bent over the top sash frame and fastened to the latter with screws. Each platform is provided with a dividing rail or stanchion which is properly supported and which is utilized for supporting the farebox. This rail and stanchion is made of 1 in. steel tubing.

There are seven windows on each side of the car, one in the left side of the vestibule. The windows are provided with double sash, the top sash stationary and the bottom sash arranged to raise 26 in. in the clear. The car is equipped with seven light-weight reversible cross seats on each side. These seats are made of steel, cherry wood and canvas-lined rattan. The rattan used in these seats is made at the plant of The Brill Company by a special method of weaving from the choicest rattan. This rattan is made to stand up under the most exacting sort of service—and it does. Motorman's seats are provided on the platforms.

The roof is of the Brill Plain Arch type, strengthened with concealed steel rafters, placed in the roof so as to relieve the strain from the trolley apparatus to the best advantage. The roof boards are tongued and grooved and fitted, being glued together with cold



SINGLE-TRUCK CAR FOR OMAHA, LINCOLN AND BEATRICE. Height from track to underside of side sills, 22 5/16 in.; height from underside of side sills over trolley boards, 8 ft. 1 1/8 in.; height from floor to center of headlining, 7 ft. 4 in.; track to step, 15¼ in.; step to platform, 12 1/16 in.; weight of truck, less wheels, axles and gears, 2490 lb.

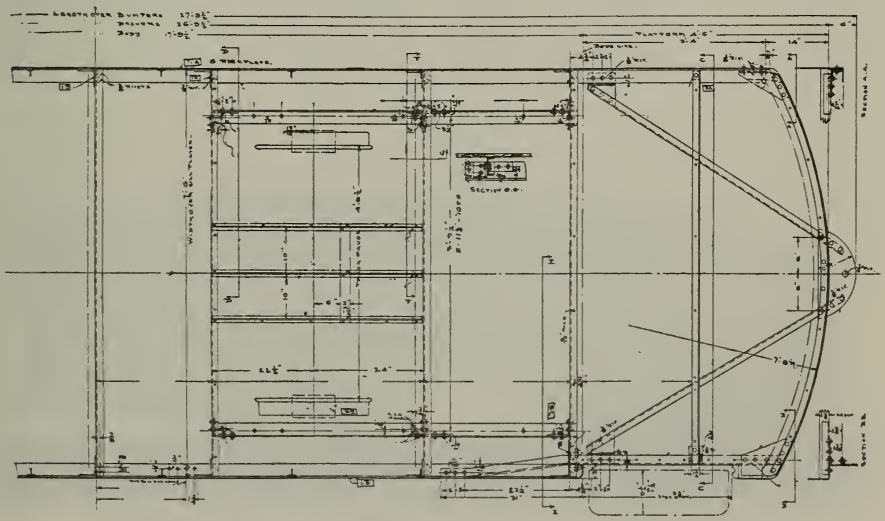
glue, and are fastened to the car-lines with nails which are countersunk. For the attachment of these roof boards the steel rafters, which are U-shaped steel, are flanked with wooden members for the reception of the roof board nails.

The roof is dressed down to an even finish after the boards have been nailed on and the nail holes are puttied. The canvas is put on over these boards still warm, properly stretched and fastened in place with tacks and suitable moulding.

The platforms have a folding door on the right-hand side, opening 30 in. in the clear. This door swings out and against the body corner posts. It is hung on steel tubing with ball bearing hinges bolted in place. The edge of the door and the door post are provided with rubber tubing.



SINGLE-TRUCK CAR FOR OMAHA, LINCOLN AND BEATRICE. The car is a typical single-truck, light-weight type, very similar to the general class of equipment that has become so very popular because of its propensity for saving power and maintenance costs



SINGLE-TRUCK CAR FOR OMAHA, LINCOLN AND BEATRICE. The side sills are of angle, the cross sills of channel, the platform knees of channel, the crown pieces of oak and the dashers of angle

Semi-Convertible Cars for Baltimore, Maryland

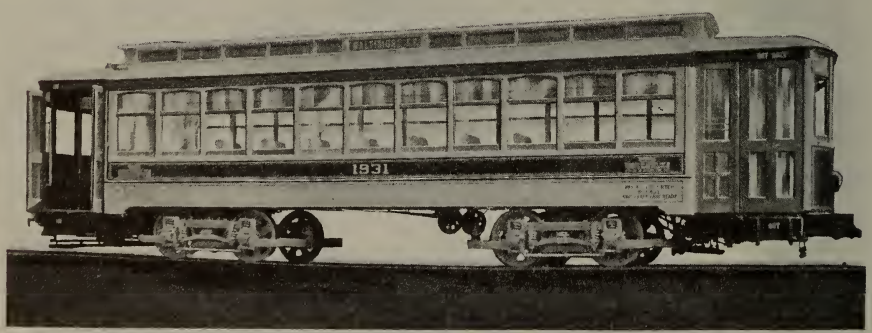
PREPAYMENT FEATURES

FOR use on the lines of the United Railways and Electric Company, of Baltimore, Maryland, The J. G. Brill Company recently completed 75 double truck, Semi-convertible pay within cars, measuring 30 ft. 8 in. over the corner posts. These cars are somewhat similar to a previous order built for the same company, but there are changes in design which make its illustration in this magazine interesting.

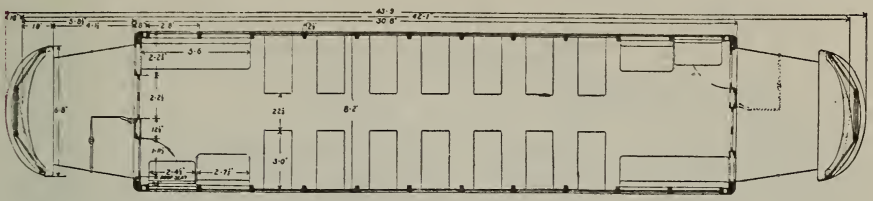
The underframes include side sills of long-leaf pine, 2¾ by 6⅞ in., made in one piece throughout. The end sills are of 10 in. channel and diagonal braces 1¼ by 3 in. are used. The end sills and the side sills at the corners are securely braced on the inside by a corner bracket extending about 12 in. along each sill. Tie rods are used throughout the framing. These tie rods form a truss with the intermediate and cross sills. The bolsters are of cast steel and are guaranteed absolutely for 150,000 miles of service against breakage or deformation resulting from poor material, design or condition of service.

In the body framing the corner posts are of white ash 4¾ in. thick. The side posts are of straight-grained white ash 2½ in. thick. The posts are mortised into the sills and fastened with strap bolts. The letter panel is of poplar in one length. The guard rails and water tables are of pine and made in one piece.

The steps are of the folding type, operated in conjunction with the folding doors. They are provided with safety treads. The



SEMI-CONVERTIBLE CARS FOR BALTIMORE, MD. The Semi-convertible feature of these cars is one of their best items. The details of the construction are perhaps too well known to the electric railway field for an iteration of them here. However, the advantages of the system are enumerated in the accompanying article



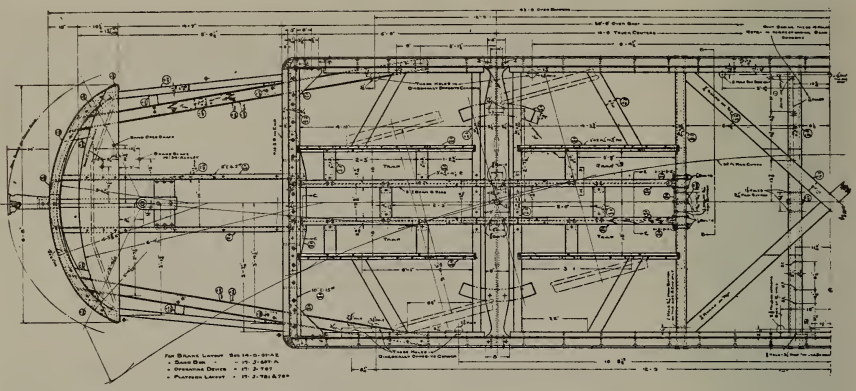
SEMI-CONVERTIBLE CARS FOR BALTIMORE, MD. Height from track to side sills, 2 ft. 10½ in.; from side sills over trolley board, 9 ft. 0 in.; track to step, 16⅞ in.; step to platform, 15⅛ in.; platform to floor, 9⅞ in.; weight of carbody less electrical equipment, 16,000 lb.; weight of electrical equipment, 1400 lb.; weight of air brake equipment, 1500 lb.; weight of trucks, 12,320 lb.; weight of motors, 9400 lb.; total weight, 40,620 lb.; seating capacity, 42

step fenders are of sheet steel attached to the knees with screws and perforated.

Each platform is fitted with a stationary vestibule. the vestibule corner posts and the two intermediate corner posts of straight-grained ash. The front of the vestibule below the belt rail is covered with sheet steel, fastened to the belt rail corner post and the crown piece. Each vestibule is supplied with three movable sashes, two of which are located on either side of the center sash and are arranged to drop into pockets between the dasher and the inside lining of the vestibule. Over each of these sash pockets there is a hinged cover. The center of these sashes is arranged to slide to the motorman's left in a groove. Over each vestibule window there is a small stationary sash. Over the center sliding vestibule sash there is a route number box. All vestibule sash, vestibule lining, sash pocket caps and post moulding is of cherry.

The side windows are arranged so that the upper and lower sashes can be raised into the side roof. This arrangement, known as the Brill Semi-convertible window system, has been on the market for a number of years and has met with the greatest amount of favor. It has many distinct advantages. In the first place a car equipped with this window system may be used for summer as well as winter service without it being necessary for storage space to be provided for the sashes. In addition, the feature of having the sashes stored within the car is a great advantage because of the ability to guard passengers against sudden changes of weather. Then, too, with the Semi-convertible system it is unnecessary to take the sashes out of their windows, a proceeding which invariably means their being fitted into place when they are restored. The opening which is given when the sashes are raised into their roof pockets is ample for comfort in the hottest weather.

The trucks upon which the cars are mounted are guaranteed for a service of 150,000 car miles, which speaks eloquently for their efficiency of design and construction. They are generally similar to those furnished on the former order and have the company's standard slid-



SEMI-CONVERTIBLE CARS FOR BALTIMORE, MD. The side sills are of pine, the end sills of channel and the bolsters are of cast steel. Tie rods and diagonal braces are used

ing brake arrangement.

The bodybrake rigging is composed of two large cast iron sheaves and one small sheave, all mounted on a 2-in. square steel shaft and supported on cast iron brackets attached to the underframe. Chains are secured to the larger sheaves and connected to the brake rods leading to the brake shafts.

The inside finish is of selected cherry, including doors, linings and mouldings. The center ceiling is of 3/16 in. Agasote, and the side ceilings ⅛ in. Agasote sand papered, decorated and held in position by screws. Except for the addition of an aluminum stripe, the decoration is the same as previous order.



SEMI-CONVERTIBLE CARS FOR BALTIMORE, MD. The trucks upon which these cars are mounted are guaranteed for 150,000 car miles of service, a guarantee which speaks eloquently for the stamina of the truck

The seats and backs of these cars are of spring covered with rattan. As shown in the accompanying diagram there are fourteen transverse reversible seats and four longitudinal non-reversible seats. In conformity with the other inside furnishing the wood work of the seats is of cherry.

The roof is of the monitor type, arranged with ventilator sash.

Prepayment Cars for Lemoyne, Pa.

BRILL 27-M. C. B. TRUCKS

THE J. G. BRILL COMPANY recently delivered to the Valley Railways, of Lemoyne, Pennsylvania, four 30 ft. 8 in. closed prepayment vestibule cars mounted on Brill 27-M. C. B. trucks for use on the company's lines. The cars are illustrated herewith and without going into details on the operation for which they were purchased a brief outline of their construction will be given.

The cars are mounted on underframes in which the side sills are of 18 by 3/16 in. steel plate reinforced at the top with a 3 by ½ in. plate and at the bottom with a 2½ by 2½ by ½ in. angle. The end sills are of 10 in. channel gusseted to the side sills and two crossings to each car are of 4 in. channel, the other two crossings being of 5 in. channel. The two center stringers also are of 4 in. channel. The center platform knees are of 4 in. channel and are riveted to the stringers. The outside platform knees are of 7 by 3½ by ½ in. angle.

In the body framing the side posts are of ash, as are also the corner posts. The sheathing of the car from the under side of the side sill plate to the window sill is of sheet steel. The letter boards are continuous around each vestibule, being carried around the carbody corner post without a break. The end bulkheads are constructed so that should the company desire at some future date to remove the end bulkhead doors and end linings, it will not be necessary to strengthen the roof.

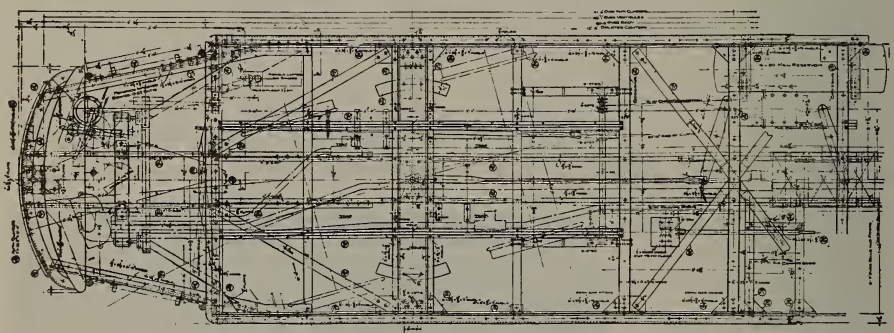
The cars are built with Brill Plain Arch Roofs, extending the full length of the car and strengthened with concealed steel rafters. The cars are provided with Brill Angle-iron Bumpers, each equipped with a bumper shield. Dedenda Gongs are also used.



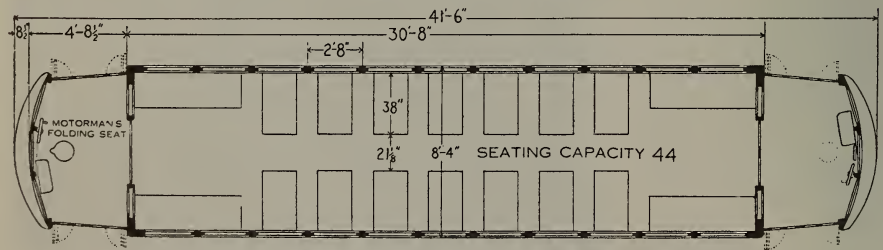
PREPAYMENT CARS FOR VALLEY RAILWAYS. A glance at the weight totals for this car, taken along in consideration with its seating capacity of 44 persons, will show the design of the car to be very efficient throughout. No item of strength has been sacrificed and yet the result is not a car that is unwieldly and power-consuming



PREPAYMENT CARS FOR VALLEY RAILWAYS. The windows are provided with two sashes, the top sash built stationary and the lower sash arranged to raise. The shape of the end window heads, vestibule sash and doors is straight, the same as the side window sash. The inside finish of the car is of best selected ash, including all doors, linings and mouldings



PREPAYMENT CARS FOR VALLEY RAILWAYS. The side sills are of plate, reinforced at the top with plate and at the bottom with angle, the end sills are of channel, the crossings are of channel, the center platform knees of channel and the outside platform knees of angle

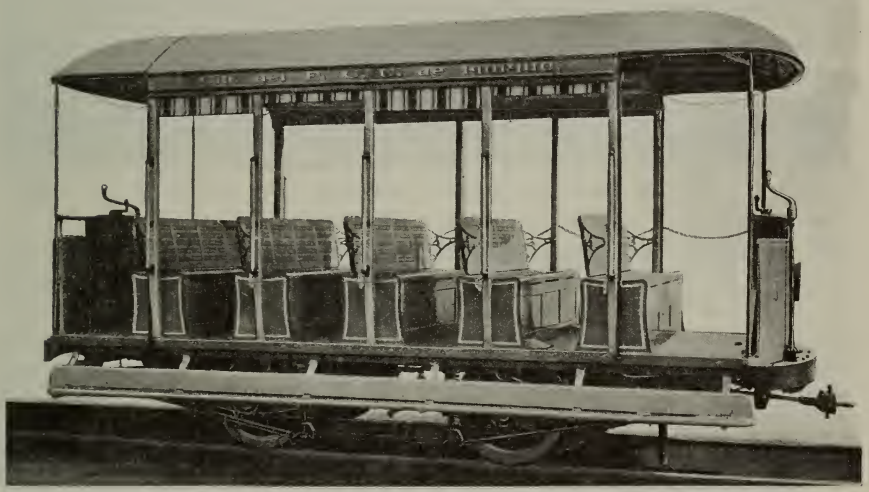


PREPAYMENT CARS FOR VALLEY RAILWAYS. Height from track to underside of side sills, 2 ft. 9⅜ in.: height from underside of side sills over trolley board, 9 ft. 0⅝ in.: height from floor to center of headlining, 7 ft. 7⅛ in.: track to step, 17½ in.; step to platform, 14½ in.: platform to floor, 8¼ in.; weight of carbody less electrical equipment, 19,190 lb.: weight of electrical equipment, 1560 lb.; weight of air brake equipment, 1200 lb.: weight of trucks, 14,090 lb.; weight of motors, 7040 lb.: total weight, 43,080 lb.

Five-Seat Open Storage Battery Car for Iquique Tramways

BRILL 74 TRUCK

THE J. G. BRILL COMPANY recently completed for the Iquique Tramways Company, of Iquique, Chile, a five-bench open, storage battery car, which is illustrated herewith. The use of the storage battery method of propulsion is quite popular throughout South America because of the cost of power plant installation which is saved by it. For many types of operation the storage battery is readily adaptable. For lines branching out from existing lines into districts which it is desirable to develop but in which the immediate demand for transportation facilities does not justify the investment which would be necessary for the installation of overhead, for short rural lines not connected with other systems, for operation of lines which do business only during certain periods of the year, as a supplement to regular steam service or as a means of transportation that best will meet some peculiar local condition—for all of these the storage battery car is well adaptable and for all of them it has been used with the greatest success.



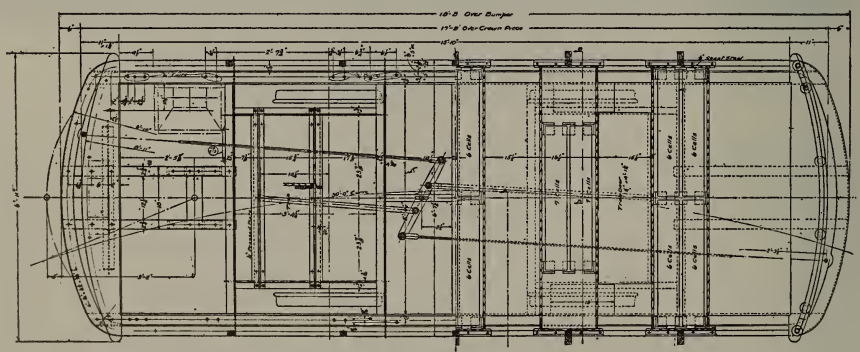
STORAGE BATTERY CAR FOR IQUIQUE, CHILE. This car is very light and well calculated to make an important saving in operating costs to the company for which it was built. The use of the Brill 74 Truck is one of the outstanding features. This truck is described in detail in Brill Bulletin No. 218

The car is built on an underframe of wood, the side sills of long leaf yellow pine and the crown pieces and crossings of oak. The bottom framing is arranged so as to be suitable for the storage battery installation. This is somewhat unusual in storage battery construction, the general rule being to place the batteries under longitudinal seats.

The truck upon which this car is mounted—the Brill 74 Truck—is the result of the demand that developed in a number of quarters a few years ago for single-truck cars of very light construction. The truck combines lightness with easy-riding qualities, stability and strength. Its use has been more than satisfactory and it has been used for both motor and trail car service. There is a slight difference between the motor and trailer types, it having been necessary to make a change in the brake rigging and in the shape of the end frames in order to allow for clearance of the motors.

The weight of the Brill 74 Truck has been cut down to nearly half that of the standard single-truck types. A 7-ft. wheelbase truck of this type, less wheels and axles, weighs but 1700 lb. This reduction in weight was obtained by making the journal boxes carry the springs, thereby relieving the side members of that duty and also doing away with the needs of pedestals. Comparatively light bars are used for the side members and these, with the angle crossings which tie the journal boxes together, form the truck frame. Brill Bulletin No. 218 goes more into detail on this truck and gives a better idea of its uses, weights, dimensions, etc.

The seats, five in number, are made reversible. The side posts are made with a sweep of five inches and the body framing throughout is of straight-grained ash and long leaf yellow pine, white leaded in all joints.



Storage Battery Car for Iquique, Chile. The underframe is of wood, the side sills of long leaf yellow pine and the crown pieces and crossings of oak. The framing is arranged so that it is readily adaptable to storage battery installation. The car weighs complete, with trucks and electrical equipment, 13,300 lb.; weight of truck, less gears, 4341 lb.; weight of gears, 174 lb.; weight of carbody less electrical equipment, 4015 lb.; weight of batteries, 2950 lb.; weight of electrical equipment on body, 500 lb.; weight of truck, 4341 lb.; weight of motors, 1494 lb.



Centrifugal Sprinkler for Petropolis, Brazil

BRILL 21-E TRUCK: 2480 GALLONS CAPACITY

THE J. G. Brill Company recently has completed for the Petropolis Tramways of Petropolis, Brazil, a 2480-gallons capacity centrifugal power sprinkler. This equipment will aid in keeping sanitary and healthful a summer resort which already has a reputation for healthfulness. The dust and dirt that collects in the streets cannot fail to be picked up during the hot, dry months by the motion of the street cars bowling along over the streets. These clouds of dust and dirt work dire havoc to the equipment, causing a very considerable depreciation, and at the same time creating a tendency toward disfavor on the part of the riding public. The use of the power sprinkler makes flushing of the streets practically from curb to curb entirely feasible at small cost and this evidence of interest in its city by the railway company invariably creates a more than favorable impression.

Petropolis is located about 37 miles from Rio de Janeiro, at an altitude of about 2700 ft., which necessarily accounts for its healthfulness. This equipment is not the first built by The Brill Company for this operation, a shipment of small single-truck cars (mounted on the Brill 21-E Truck) having been made in 1912. These earlier cars were described in BRILL MAGAZINE for September of that year, to which article attention is called.

Buses for Binghamton Automobile Company, of Binghamton, New York

CAPACITY, THIRTY-ONE PASSENGERS

THE Binghamton Automobile Company, of Binghamton, N. Y., recently had built by The J. G. Brill Company two of the most interesting auto buses that have been turned out for some time. This bus is illustrated in connection with this article describing its construction. For a long period of time The Brill Company has been evolving and standardizing motor omnibus bodies and a very large number of bodies of all descriptions have been built here at the Brill plant. The adaptability of the Brill plant to this sort of work is made very plain by the fact that this class of manufacture belongs more to the trolley-car building art than to that of carriage and coach building. The severity of operating conditions makes it necessary for the bodies to be strong and rugged and able to stand up for a long time. Many of the features of trolley car practice are so perfectly suited to the manufacture of buses that the logic of the Brill plant's adaptability to this line of work readily may be seen. A Brill bulletin—No. 217—describes and illustrates a good number of the styles of buses turned out at the Brill plant and this bulletin is well worth investigation.

The bottom frame of the bus shown herewith is made of wood



BUSES FOR BINGHAMTON AUTOMOBILE COMPANY. These buses are but another proof of the entire adaptability of The Brill Company's plant to the manufacture of automobile bus bodies that will stand up under the hardest kind of service. Brill buses are built along trolley car lines, as far as the details of their construction are concerned. In short, they are rugged, strong and able to stand up under the most exacting service

and the side sills and crossings are of oak. Trapdoors are provided for the floor, the rear trapdoor over the worm housing and the two trapdoors in the front covering the transmission and the clutch respectively. The flooring is of spruce and the floor is provided with maple floor mat strips, which are made tapering and which extend the full length of the body in the aisle.



BUSES FOR BINGHAMTON AUTOMOBILE COMPANY. The emergency door, at the rear of the bus, which just escapes being shown in the illustration, is one of the most important features. This emergency door is formed by making the two sashes of the last window on the left side a unit and having them swing on hinges fastened to the corner post. This emergency door is easily opened, being secured by two bolts which are easy to unfasten

The body framing is of ash and yellow pine, thoroughly dry and seasoned. The corner posts are of ash, as are also the side posts. These posts are cut with a sweep of 1½ in. A water table of poplar is provided on the edge of each side of the body. The side panels below the window rails are of sheet steel.

At the rear of the bus, on the left-hand side facing forward, there is an emergency exit which opens out. This is accomplished by making the two sashes a unit in this rear window and having them swing on hinges fastened to the rear corner post, being secured in place by bolts which are easily unfastened by the passenger.

There are eight windows on the right-hand side of the bus and nine windows on the left-hand side, the windows provided with double sash, the top sash continuous and made stationary and the lower sash arranged to raise. The windows are provided with wooden sash stiles. At the rear end of the bus there are three windows, each provided with two sash, and all of these sashes made stationary with the exception of the upper sash in the middle window, which is arranged on pivots, so as to swing open for added ventilation. The upper sashes in these rear windows are glazed with chipped glass.

At the front of the bus, in front of the driver, there are provided two windows with double sash, the top sash stationary and the lower sash arranged to raise. The top sash on the left-hand side of the body, in front of the driver, is glazed with frosted glass. Also, on this side of the bus is located a glass windshield.

SUGGESTIVE SUBJECTS

Note.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

A WASTED PRINTER'S BILL?

A THING which on the face of it seems rather unimportant, but which really carries more weight than many railway men apparently realize, was brought to our attention recently. On a line operating at one of our most popular seashore resorts what is practically a complete equipment of open cars is in use. Recently the company began the custom of issuing a very attractive little bulletin. This pamphlet was carefully planned from stem to stern and nicely printed, but a crimp was put into its usefulness by apparent lack of thought as to the proper means of distribution. In the standard twelve-bench cars of the company (seating about 72 passengers) there were placed just two holders for these pamphlets, one holder on a post near the front of the car and one near the rear. Consequently the people who chanced to be on the seat on whose post there was a box had their attention called to the pamphlets and, perhaps, those in the next seat behind might see the box and reach over for a pamphlet, but that at best made the procuring of the pamphlet possible to the occupants of but four seats out of the twelve. In other words, 48 out of 72 possible readers of the company's message (or two-thirds) were entirely overlooked. To place a little box for the pamphlets on every post would have meant an expenditure of but a very small amount and certainly would have enhanced the value to the company of the pamphlet, besides doing away with all possibility of pique on the part of passengers three or four benches removed from the little box of folders. A passenger scarcely can be expected to leave his seat and walk along the running-board of an open car to procure one of the company's folders, which should have been placed within his easy reach. To put a message "across" with certainty it should be thrown so directly into the path of the man for whom it is aimed that he cannot possibly avoid it. Perhaps in this specific case the printer's bill was offset by the good the pamphlet did with the comparatively few people who had an opportunity to read it, but certain it is that it might have done just three times as much good.

YOUR GOAT

THERE is another word that modern slang has given our English language which is harmless and more than expressive—"goat." You know how some people work on your sensibilities, make you nervous, ruffle you, get your "goat," in short? Well, that's what we want to see about—whether or not you are keeping your goat penned up tightly enough. Everyone has a temper—not temperament, that's a rather mythical thing at best. Everyone must have a temper or he would be like something without salt, without flavor. Temper is an indication of character. But the manner in which you control or fail to control your temper is a more certain indication of your character. There is no class of men who come into contact with a greater variety of annoying incidents in their daily routine than do you platform men. All sorts and conditions of uncontrolled and in many cases uncontrollable tempers are encountered every day and the degree of your success and of your worth to the company by which you are employed depends upon the way in which you handle yourself in the face of these many annoying incidents. Some people are cross and irritable and expect that when they invest a nickel in a carride they

should be presented with the World and a little red fence around it. But after all is not that merely their belief in the efficiency of the modern railway? Of course it is, and it is up to you as a member of that profession of railroading to do your bit toward upholding the reputation of your profession. Besides that you are doing yourself a very great service because your efforts will be noticed and recognized and your reward will not be slow in coming.

THE PLATFORM MAN A SALESMAN

A SOMEWHAT hackneyed title? Yes, but one that should be written upon and written upon and written upon. So much has been said of courtesy and its importance to the railway and therefore to the men employed by that railway that the subject is in danger of getting into the same condition as the oft-repeated "Safety First," two words that stand for a great deal but that have been repeated and repeated and repeated so that practically everyone recognizes them, and the tendency would seem to be for the thing for which they stand to become a little beshrouded, a little vague. Simply to say "Safety First" is not enough. Everyone knows what Safety First as a generality means. The thing that is of paramount interest and of paramount utility is for some new thought, some new idea to be carried with each mention of the pat little pair of words.

The same thing applies to the question of the platform man being a salesman—a subject which is closely akin to the matter of courtesy. In the first place, there is not a single business which does not have for its cardinal principle the selling of some one thing and the selling of that thing, that commodity, that article, means simply service. The man who shows his customer the best service is the man who takes the bonus-bringing orders.

Every large business corporation throughout this and every other country has realized to its fullest extent the value of a reputation for service that remains at its desired high standard through thick and thin. Courtesy is the thing everywhere. Large business houses are spending thousands of dollars annually in an effort to train their employes into the ways of consistently courteous handling of their customers. They realize that a customer is not represented by the single purchase but rather by his potential purchases.

It is exactly the same thing with the street railway. The railway MUST bring its service up to such a standard that the riding public will recognize at a single glance that the treatment accorded by the company's employes is uniformly courteous. It is not the nickel that the customer spends with the company for his single ride on that hot, grouchy, bad-tempered day when the thermometer is sizzling and the conductor gives him impudence; no, it is rather the dollars into which his nickels will melt themselves before the end of a year that really count and it is these dollars that you as a representative of the company that is paying you your bread and butter must take into consideration before you parcel out anything in the way of discourteous treatment to any of your passengers.

The company for which you work depends upon the sale of its services, its transportation, to the riding public for its livelihood. You platform men are the company's salesmen. It is through you that the riding public forms its opinion of the company and the company's services. Therefore, it is vitally important that you use every effort to instil in the minds of your customers—your passengers—the idea that your company is doing everything within its power to render good service. Make yourself responsible for the safe conduct of each and every one of your passengers. See to it that everyone who boards your car leaves it with at least a neutral impression. Don't let anyone go away with a bad impression and in every case try to make that impression a very favorable one.

WE HAVE WITH US—SPRING

THE time of the year when the young man's fancy lightly turns to thoughts of love is here once more. And the magic effect of this wondrous season is not limited to the young man, either. It hits us older folks sometimes, too, doesn't it? And love doesn't mean in every case a visitation from little Mr. Daniel Cupid. There are those of us who love the flowers and the woods and the green hills and the pure, sweet open air to be found only there. Why not make a drive on us, Mr. Street Railway Manager? Tell us what is the matter with us, what spring has done to us—or for us and sell us your service. City-bound people should be *made* to get out into the fresh, clean country and saturate themselves with wholesome atmosphere and to drive home to them the fact that *your* cars will take them there in so many minutes and for so many pennies is doing both them and your line a favor. Yes, now certainly is the time for intensive advertising of this feature of your service. Poke your way into the notice of the public at every opportunity and keep your patrons aware of the benefits of your service. If we can be of service to you in the way of furnishing ideas, suggestions or material, write us and it will be our pleasure to co-operate with you and to tell you of what other people have done.

A good, clean brain kept keyed up to the minute and well occupied with good, clean things upon which to work is the surest route to success.

Are you thinking? Honestly, now, are you? T-H-I-N-K, five letters only, but what a wonderful amount of the success that big men have attained is traceable to those five letters!!

Are you willing to stay put? No? Then get into touch with your own particular ladder to success. Find out how to do the work of the man just above you and before you know it you'll be off that platform job and well started on your upward climb.

DETAILS

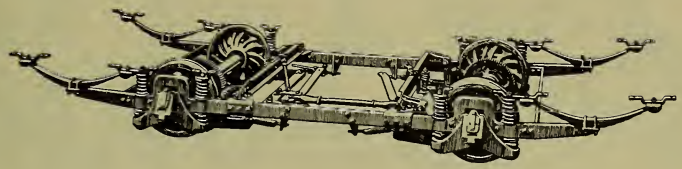
THE big man gets to such a point that he cannot afford to bother himself with details, but just now details are the things by which your ability must be judged. Are you up to the job of the man just above you? Do you know the details of his work? And, too, how about the details of your own job? How are you punching transfers? Do you waste a ream or two of paper every trip or do you keep them running along properly? How about change? Do you fight the man—or woman—who hands you five pennies? Remember, there are just one hundred pennies in a dollar and the dollars are what make our wheels turn around. How about reports? Are you costing your company lots of money each year in damage claims against which no defense can be built because of lack of witnesses and other necessary information? And, above all, how about courtesy? That is the most important detail of all and the one upon which your success or failure very largely depends. Look into your courtesy record from the viewpoint of a disinterested outsider and see how you stack up.

How about the calling of streets? Why depend upon your memory to see to it that this, that or the other person gets off at the proper place. Call ALL *the streets and call them in no uncertain tones—so that there will be no chance of mistakes.*

CHANGES OF ADDRESS

THOSE who receive "Brill Magazine" are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.

LIGHT-WEIGHT 21-E TRUCK



THE Brill Light-weight 21-E Truck has the same essential features as the long-recognized regular 21-E, but lighter in weight by about 1800 lb. The truck has a wheelbase of 8 ft. and wheels of 24-in. diameter. The use of these small wheels makes the wheelbase 6 in. longer than would be the case were 33-in. wheels used. The brake rigging is arranged inside the wheels, thus effecting a substantial decrease in weight

THE J. G. BRILL COMPANY

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JOHN STEPHENSON CO., ELIZABETH, N. J.
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Cable Address: "Bogibril," Paris

Agencies

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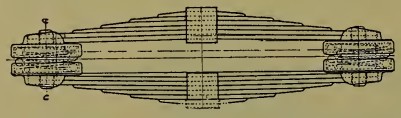
ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158, Buenos Aires

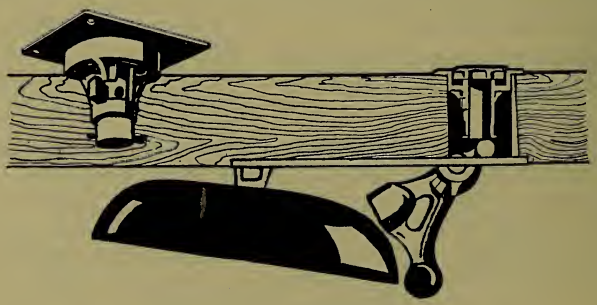
NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

Bring Your Trucks Up-To-Date



THE device illustrated herewith will be of vital interest, we feel sure, to railways whose cars are equipped with trucks purchased before the perfection of the Brill Graduated Spring System, the advantages of which as relates to the good riding qualities produced are so well known. The spring shown may be substituted for your old type, thus bringing your trucks up-to-date without making any further change, it being unnecessary to alter the form of the truck bolster. This device is the nearest possible approach to the efficient Brill Interposed Spring System—or Graduated Spring System. And, best of all, it may be applied to *any* make of trucks. Tell us to give you more complete information.

BRILL DEDENDA GONG

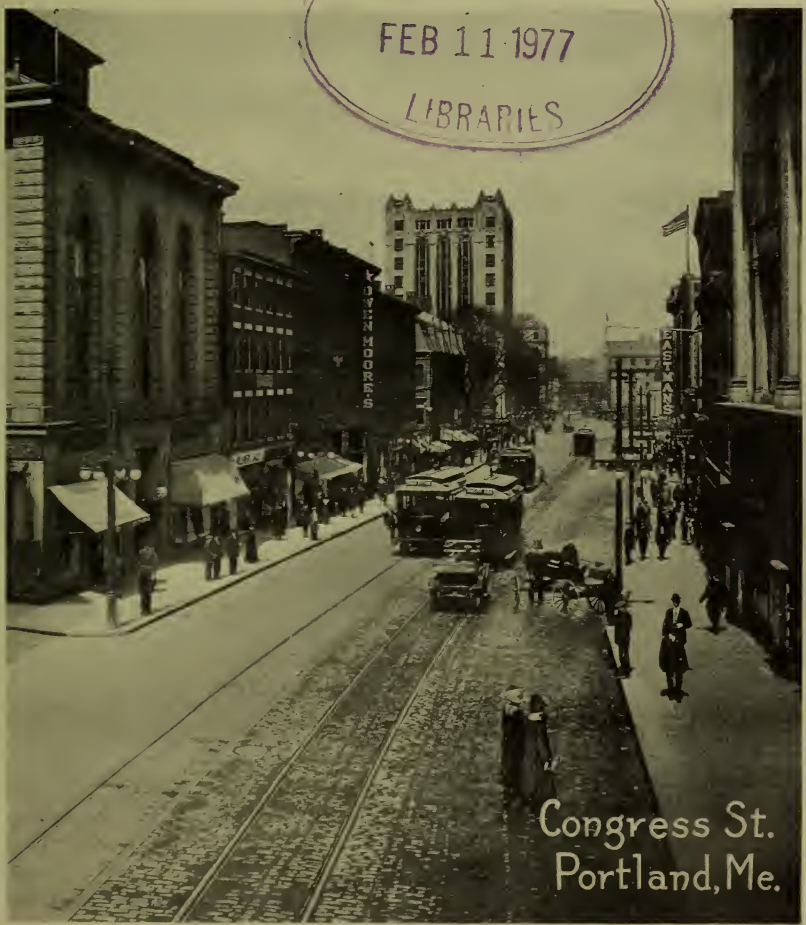


THE popularity of this gong may be told in a comparatively few words—there cannot possibly be produced any sort of a chattering sound, either by accident or design. The pedal may be locked down on the dead end of the car, so that the gong cannot be tampered with by passengers and cannot be sounded by anyone who steps upon the top of the pedal by accident.

VOL. 11 JUNE, 1917 NO. 6

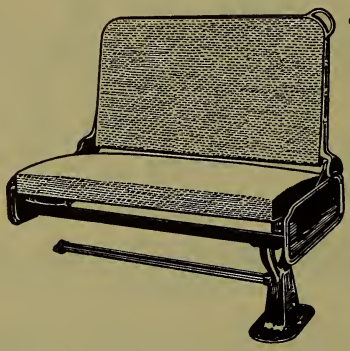
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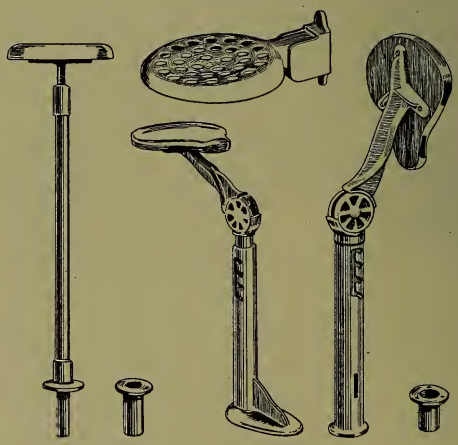
CAR FURNITURE

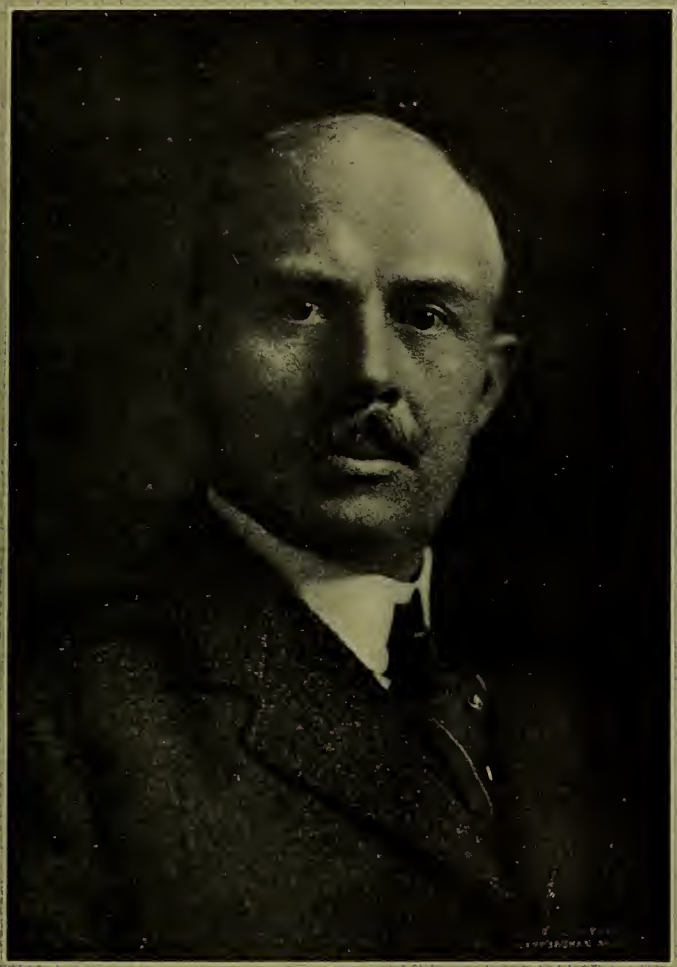


"WINNER" Seats for city and interurban cars are made in every detail in our own shops, and so expertly made and so particularly supervised and inspected that they continue to keep in good shape and good working condition after many years of service. The quality of the steel, wood, rattan, canvas, felt and webbing that go into their make-up is rigidly kept up to the original standard.

KEEP OPERATORS ALERT

THESE saddle and circular types of motormen's and conductors' seats with movable and stationary pedestals are of generous dimensions and yet take up very little room. The all-metal seat folds closely against the wall or post to which it is attached. Their use keeps operators fresh in mind and body.





A. H. FORD

Vice-President & General Manager, Cumberland County Power & Light Co. of Portland, Me.
President, New England Street Railway Club

BRILL MAGAZINE

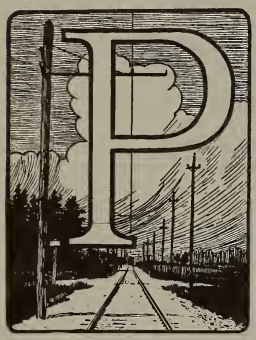
VOL. 11—NO. 6 Copyright, 1917, by The J. G. Brill Company, Philadelphia, U. S. A. JUNE 15, 1917

ALBERT HALSEY FORD

ALBERT HALSEY FORD was born in New York City, July 28, 1859. He went to the public schools there and at the age of 16 left high school to enter his first employment as clerk in a coal yard at Evansville, Ind. On September 1, 1893, he entered the street railway business as Secretary and Treasurer of the New Orleans Traction Company, New Orleans, La., where he remained until April 1, 1900, when he was appointed General Manager of the New Orleans & Carrollton Railway Company. In 1902 when this road was combined with other railways in New Orleans, Mr. Ford was engaged by the banking firm of Isadore Newman & Sons, as their confidential man in railway affairs. After 4 years with this firm Mr. Ford became connected, in 1904, with Ford, Bacon & Davis of New York, and was made Manager of the operating department of their southern properties. In 1907 he was appointed President and General Manager of the Birmingham Railway, Light & Power Company of Birmingham, Alabama, and during his occupancy of this position important changes were made in the Birmingham property which has placed it in the front ranks of the electric railways of the United States. On June 1, 1914, he was appointed Vice-President and General Manager of The Cumberland County Power & Light Company of Portland, Me. Mr. Ford is a member of the American Electric Railway Association, the National Electric Light Association and the New England Street Railway Club.

Interurban Centers and Interuban Cars

PORTLAND, MAINE



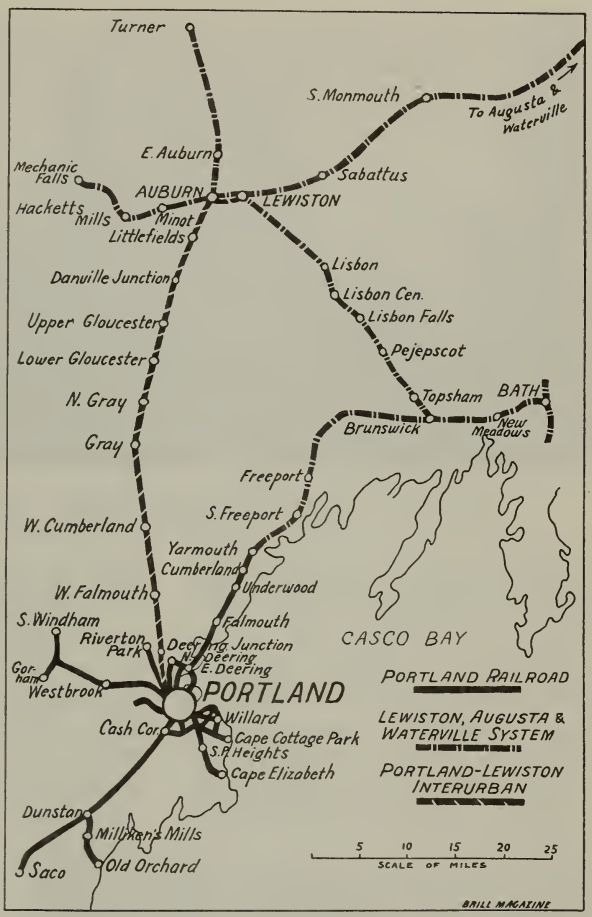
PORTLAND is the chief city in population (70,000), manufacturing and commerce of the State of Maine. It is situated on Casco Bay about 100 miles northeast of Boston and is the principal railway center and seaport between Boston and Halifax. The greater part of the city occupies a hilly peninsula about 3 miles long by ¾ mile average width. The high ground and the surrounding bay with its many islands furnishes a picturesque setting for this city of attractive and substantial homes, commodious business buildings and modern factories. The country to the north is undulating farm land with some spruce and pine forest, many lakes and rivers. The principal cities of the region are on the Kennebec and Androscoggin Rivers and therefore interurban electric railway development has proceeded in their direction. On these and other rivers are paper and pulp mills which use the spruce from the neighboring forests. Cutting timber and farming in the interior and fishing on the coast are the chief industries. The abundance of water power, excellent transportation facilities and plentiful high-grade labor have caused many and diverse manufacturing concerns to establish factories and mills near towns and villages as well as in the cities.

Portland leads in manufacturing and its industries include foundries and machine shops, planing mills, car and repair shops, packing and canning establishments, factories for making boots, shoes, clothing, matches, carriages, etc. Among the institutions located here are the Medical School of Maine, Medical Department of Bowdoin College, Westbrook Seminary, the Public Library, Library of the Maine Historical Society, The Mechanics' Library, Greenleaf Law Library, Maine General Hospital and the U. S. Marine Hospital.

Although not a summer resort, Portland frequently has, during the summer months, a transient population equal to its settled population. This is because Maine attracts the largest number of summer visitors of any State in the Union and Portland is its chief gateway for those who come either by land or sea. Seventy thousand visitors a day means a great deal more than double the normal demand on the local transportation facilities, since most of this number spend but a few hours or a day or two in the city, and their principal occupation while here is to see the points of interest within its boun-

daries and nearby or be transported between the steam boat wharves and railway stations.

Within 150 miles northward of Portland and reached by railways radiating from this point are the picturesque lakes, rivers, mountains and forests which have made the region famous and are enjoyed by thousands of health and pleasure seekers every year. Down the coast are Old Orchard and other celebrated beaches. To eastward the rugged and irregular shore line with numerous islands is the "rock-bound coast" of popular conception. The population of the fishing towns and villages along the entire shore expands enormously in summer and the countless number and character of large hotels and fine summer residences show that the invigorating climate and varied attractions of the seacoast life never fail to bring back the ever-increasing swarm of summer visitors.



INTERURBAN CENTERS AND CARS, PORTLAND. Approximately 150 miles of interurban lines directly center at Portland. Other extensive interurban systems connect at the northern and southern terminal cities of these lines

The transportation lines in and around Portland are therefore in the advantageous position of having an additional source of revenue, and have alertly made use of every means whereby the business could be increased—adequate equipment, frequent schedules, attractive resorts and well-planned advertising.

The interurban lines which center at Portland are operated by the Cumberland County Power & Light Company with the exception of a line operated by the Andros-



INTERURBAN CENTERS AND CARS, PORTLAND. Monument Square, Portland. Cumberland County Power & Light Company's offices on far side at right. All city and interurban cars of the Portland Railroad start here

coggin Electric Company known as the Portland-Lewiston Interurban.

The map on page 163 shows the Cumberland County Power & Light Company's system, which comprises the largest electric railway mileage and operates the largest number of cars in the State.



Trestle over Boston & Maine Railroad on line to Old Orchard Beach

Although the company's lines are all connected and form one system, they are divided into two sections, the northern being the Lewiston, Augusta & Waterville Street Railway (center-entrance steel cars are now being built by the Wason Manufacturing Company. An article on these cars will be published in an early issue), and the southern, serving Portland and vicinity, known as the Portland Railroad. As there is no through service from the northern section of this system, only the Portland Railroad and the Portland-Lewiston Interurban will be considered in this article as the interurban lines which



INTERURBAN CENTERS AND CARS, PORTLAND. New Million-Dollar Bridge between Portland and South Portland

center at the city of Portland.

The Portland Railroad interurban lines have as their terminal cities, Westbrook, Biddeford, Saco and South Portland, these, with Portland, having a combined population of about 125,000. The trackage is comprised of 67 miles of single lines and 33½ miles of double. The single lines are equipped with automatic block signals and further signal installations are under consideration. Outside the cities the lines are along the highways and thus gain a larger volume of local traffic than if on private right-of-way. Connections are made at Saco with the Biddeford & Saco Railroad; at Portland with the Portland & Lewiston Interurban and at Yarmouth with the Lewiston, Augusta & Waterville Street Railway.

The company furnishes its own current and operates the entire trackage by trolley. Old stations have been modernized and new installations are of the most advanced construction. The power stations have an output as follows: Forest Avenue (steam), 4,050 kw.; Plum Street (steam), 2,470 kw.;



Scene on the Yarmouth Division









PORTLAND RAILROAD

Forest Avenue Power Station
St. John Street Car Shops

Bonny Eagle Power Station
Cape Cottage Casino

North Gorham (water), 2,000 kw.; West Buxton (water), 3,000 kw.; Bonny Eagle (water), 7,200 kw.; Great Falls (water), 2,400 kw. A station at Hiram, formerly known as the Great Falls station, is now under construction and has not yet been put into operation, but will be completed this summer. It will have an ultimate capacity of 12,500 kw., and is said to be one of the most efficient water stations ever built. Current is transmitted from the power houses at 38,200 volts a. c., and put on the lines for car operation at 550 volts d. c.



Closed interurban car of the Portland Railroad. Brill "Semi-convertible" type mounted on Brill 27-E Trucks

A unique operating feature of the lines is that every city and interurban car of the Portland Railroad passes through Monument Square in which is located the company's general offices. The cars are operated singly, but trailer service is contemplated as a probability of the near future. Normal service calls for 96 closed cars and 100 open; the total available number of cars at present is 112 closed and 108 open. City stops average 17 to the mile and interurban, 6. On the interurban lines the maximum speed is 30 m. per hr. Traffic statistics for the past year show a total of 24,741,780 passengers carried; 4,206,056 passenger car miles, 25,032 car hours, and 140,143 freight car miles operated.

The greatest traffic problem of the system is the handling of the summer crowds to the company's famous resort, Old Orchard Beach. This is said to be the most perfect bathing head in the world and to its natural attractions have been added everything that pleasure and convenience could desire.

The freight business of the Portland Railroad has grown enor-



Open interurban car on the Portland Railroad. Brill "Narragansett" type mounted on Brill 27-G Trucks



Interurban Centers and Cars, Portland. Standard passenger car of the Lewiston-Portland Interurban System. Mounted on Brill 27-M. C. B. Trucks

mously in the last year. Previous to 1915 one of the old line express companies handled all of this business; in that year a freight service was inaugurated under a well-organized department equipped with motor cars and trailers both of box and flat types. A new freight shed was constructed in Portland in 1916 and recently has been doubled in capacity. Less than car load lots, package freight and car load freight are handled in trailers. The express business is handled on the regular freight cars and any less than car load lots is taken for a separate old line express company.

As will be seen in the illustration on page 167 the cars used in interurban service on the lines of the Portland Railroad have the appearance of a suburban type. With the interurban lines laid in the highways and the density of population calling for a high average of stops outside of cities, together with the necessity of operating on the city lines with frequent stops, cars of this character are required. They measure 43 ft. 10 in. over the vestibules, are 8 ft. 6 in. wide, have 24 ft. 2 in. bolster centers, weigh 46,000 lbs., and are of wooden construction, except those of comparatively recent type, which have steel underframes. Some have a smoking compartment and the seating capacities are either 46 or 48. All cars in interurban service are arranged for double-end operation and equipped K-type control. Four motors of 65 hp. each are used per car.

The Portland-Lewiston Interurban, operated by the Androscoggin Electric Company, is a 30-mile line operating directly between Portland and Lewiston and having about 5 miles more trackage in the terminal cities and between Lewiston and Auburn. This is a typical interurban line built on a 50-ft. private right-of-way and having passenger stations along the route. Of the eight reinforced concrete bridges of the line, one which crosses the Presumpscott River is 200 ft. long and two are 100 ft. each. The line has only been in

operation since July, 1914, but from the first has had a highly successful history. Between the terminals the towns are small and the rural population sparse; however, there is a considerable and steadily growing volume of through traffic which at first was diverted from the steam route because of frequent schedules, lower fares and equal speed, and since has largely been created by the excellent character of service maintained.

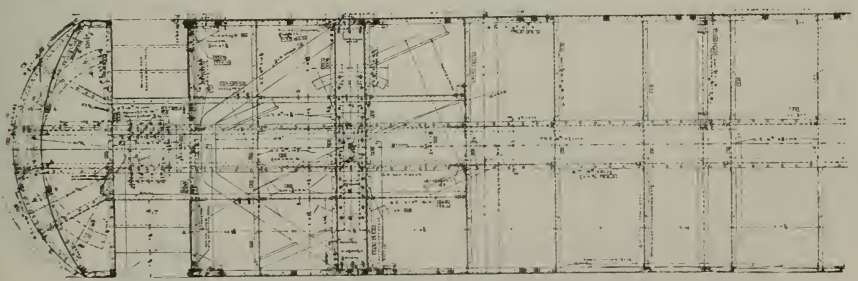
Power is furnished from the Androscoggin Electric Company's hydro-electric plant at Deer Rips on the Androscoggin River and steam turbine auxiliary stations at Lewiston, and distributed to substations at Danville, Gray and West Falmouth. The trolley is of catenary suspension type with messenger wire of copper utilized as the feeder.

Eleven motor and 11 other cars comprise the present rolling stock. The passenger cars are 46 ft. long over all and 8 ft. 8¾ in. wide over the sheathing; they have a main compartment 30 ft. long and seating 44 passengers and a smoking compartment 6 ft. long, seating 8. Four 90-hp. motors, automatic air multiple-unit control and straight-air brakes are included in the equipment of each car. They are arranged for double-end operation and have train doors in the vestibules. The total weight of a car is 34 tons and the maximum operating speed is 60 miles per hour.

Steel Combination Car for Arkansas Valley Interurban Railway, Wichita, Kansas

BRILL 27-M. C. B. TRUCKS

AN interurban car which embodies the latest developments in steel construction was delivered a few weeks ago to the Arkansas Valley Interurban Railway Company by the American Car Company. The car was designed by the builders to operate singly or with a trailer on a high-speed line which runs north from Wichita to Newton and continues west to Hutchinson, traversing a fertile



STEEL CAR FOR ARKANSAS VALLEY RAILWAY. The underframe is constructed entirely of steel beams, channels and angles gusseted at all joints

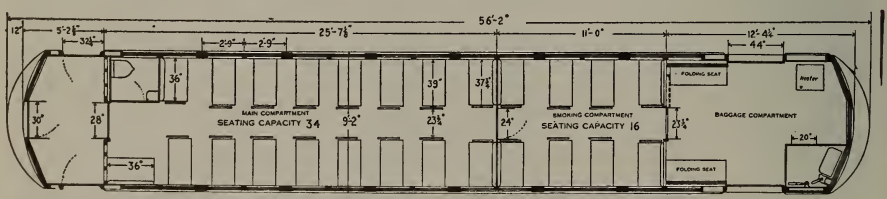


STEEL CAR FOR ARKANSAS VALLEY RAILWAY. It is evident from the car that the line is equipped for heavy and high-speed operation. Brill 27-M. C. B. 2 Trucks carry the car and are capable of a speed of 60 miles per hour

and populous district and connecting a number of important towns. (See article in April, 1917, issue of BRILL MAGAZINE on car for locomotive and express service on this railway.)

In general the car is of steel construction with main, smoking and baggage compartments and equipped for single-end operation. The design of the body, trucks and equipment conforms to M. C. B. standards and implies a substantial track and roadbed with stations far enough apart to permit of high rates of speed. As a whole the car forms a very complete interpretation of western ideas of interurban equipment and service. It is big, handsome, thoroughly modern and the roomy, bright and attractive interior with its well-planned compartments and comfortable seats will doubtless win additional traffic to this splendidly equipped and successful railway system.

Steel beams, channels and angles connected at all joints with angle gussets constitute the underframe; the side and upper structure are also of steel with side posts of 2½ by ¼-in. tees. The corner posts and each alternate side post are double and all posts are riveted to the side sill, belt rail, side plate, letter panel and outside sheathing. The side plates are composed of 3 by 2 by ¼-in. angles and the belt rails of 2½ by ½-in. bars. Letter panels of No. 12 gauge steel are continuous around the sides and



Height from underside of sills to top of roof, 9 ft. 6 in.; height from track to top of trolley platform, 13 ft. 4 in. Weight of body, exclusive of electric power equipment and air brakes, 34,000 lb. (estimated)

ends and are riveted to all posts; this steel is also employed for the sides below the windows and for the compartment partitions. Additional resistance against vertical strains is provided by inside and under trusses, the inside consisting of 2½ by ⅜-in. wrought iron extending the entire length of the body, and the under trusses of 1½-in. rod anchored at the bolsters and bearing on malleable-iron queen posts under the ends of I-section needle-beams. The side walls below the windows are double with 2¾-in. air space between the outside steel sheathing, and the inside lining is of ¼-in. agasote.



STEEL CAR FOR ARKANSAS VALLEY RAILWAY. The ceiling, large panels and side-wall linings are of hard finished composite material. The ceiling is painted cream color to reflect light

The floor is double and consists of 13/16 by 3¼-in. yellow pine with two thicknesses of water-proof building felt between. The lower floor is laid diagonally and secured to nailing sills bolted to the underframe; the top floor is laid lengthwise of the car.

Steel carlines support the plain-arch roof, and wooden carlines, spaced at 10-in. centers, serve for the attachment of the roof sheathing and the ceiling. Trolley platforms are full length of the body and mats are provided to protect the roof ends from the trolleys.

Each side of the car has 14 windows of twin type. The upper sashes are stationary and each extends across two lower sashes concealing with pressed prism plate glass the single side posts; the inside upper sashes are fitted with leaded cathedral glass. The lower sashes are arranged to raise between the double upper sashes.

A swing door is provided in the center of the rear vestibule for train passage. Each side of the vestibule has a swing door and triple steps with trap door equipped underneath with a diagonally attached grab handle. The doors at the sides of the baggage compartment are of the sliding type with sliding screens to take their place in summer. The vestibule steps have ¼-in. steel plate hangers with tube binding; the treads are of oak with enameled nosings and covered with safety treads.

All doors, sashes, mouldings and



STEEL CAR FOR ARKANSAS VALLEY RAILWAY. Height of couplers and other dimensions and features are in conformity with M. C. B. standards and practice

small panels are made of cherry stained mahogany and the varnish rubbed to a dull finish. The ceiling is of cream color to increase the light by reflection. The main and smoking compartments are finished in the same style and are separated by a glazed partition. Ash is used for the lining and stanchions of the baggage compartment and for the bars that form the side door pockets. The windows of this compartment are protected by iron rods spaced 3 in. apart.

The motorman's cab in the right forward corner of the baggage compartment has a hinged entrance door and a drop window at the side. The toilet room at the rear of the main compartment has a side-wall type of flush closet with overhead tank. A removable metal water cooler is placed in an alcove in the toilet room partition and arranged to keep the ice from coming in contact with the water in accordance with the laws of Kansas.

In the main compartment the seats are of the Brill stationary-back type with head-roll, bronze grab-handle, arm rest, foot rail and spring-edge cushions; they are upholstered in dark green plush. Those in the smoking compartment are the same except they are upholstered in leather and four have reversible backs. Ash slat seats hinged to the side walls are provided in the baggage compartment.

Included in the equipment of the car are a hot air heater located in the baggage compartment, 8 ventilators in the roof, parcel racks, air whistle and gong, track sanders and M. C. B. radial couplers.

Brill trucks of the 27-M. C. B.-2 type carry the car and are equipped with 34-in. rolled steel wheels.

Express-Freight Cars for Bay State Railway

STEEL UNDERFRAME, SEMI-STEEL BODIES

SEVEN cars for heavy freight and express service and mounted on high-speed trucks were lately delivered to the Bay State Street Railway Company at Lowell, Mass., by the Wason Manufacturing Company, and were the first of this type to go into operation on this extensive system. The general design was furnished by the railway company and completed as to details by the builder. When the cars left the Wason plant they were ready for immediate operation.



Length over bumpers, 39 ft.; over vestibules, 38 ft. 2 in.; length of freight compartment, 32 ft.; width over sills, 8 ft. 0⅞ in.; over side sheathing, 8 ft. 2 in. Height from track to underside of side sills, 2 ft. 11⅜ in.; from underside of sills over trolley boards, 8 ft. 10 in. Weight of body with air brake and electric equipment, 29,800 lb.; weight of two Brill 27-M.C.B. trucks, 11,220 lb.; weight of four motors, 16,380 lb.; total weight, 57,400 lb.

The underframe has angle side sills reinforced with 18 by ¼-in. truss plates; 8-in. channel center sills extending from bumper to bumper; needle beams of bolster design with 3-in. channel top member and 4-in. channel bottom member, and a center beam of reversed bolster construction made up of 4-in. channels and secured to the truss plates below the angle sills with ¼-in. gussets. In the side construction, 30 by 3/16-in. side plates reinforced at the top with 2 by 1½ by 3/16-in. angles, and body plates of 2½ by 2 by 3/16-in. angles, which extend beyond the corner posts to provide a connection for the bonnet bows of the vestibules, are the principle longitudinal members. The corner posts and center door posts are of 4 by 4 by ¼-in. angles braced with 4-in. channels, and the bolster of 4-in. channel. Steel carlines for the support of the plain-arch roof are as follows: 2½ by 2½ by ¼-in. angles attached to the corner posts; and trussed carlines of 2 by 2½ by

3/16-in. angles attached to the bolster and center door posts.

The bottom floor is of 1¼-in. hard pine laid crosswise, spaced 4 in. between each two planks and bolted to the center and side sills. The finishing floor is of ⅞-in. oak, tongued and grooved and laid diagonally. The side of the body is sheathed with tongued and grooved hard pine. Ash of 1¾-in. thickness is used for the side doors, and of 1⅛-in. for the double-folding end doors.

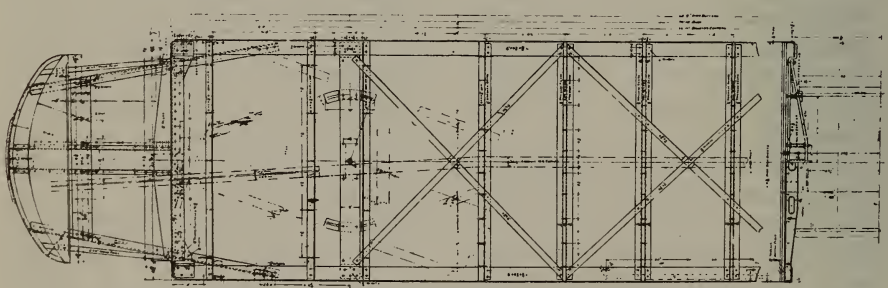
At each end of the cars is a partition framed of angles and filled in with wooden slats. Three drop windows are provided at each end. There are no linings for the sides or the roof, but to prevent boxes and packages from striking against the side posts, hardwood boards, 4 by ⅝ in., are secured to the sides along the floor at the connection of the sill body plate and wooden shield, and three above, equally spaced apart. Six ventilators are located directly under the body plate on each side.

The cars are mounted on Brill 27-M. C. B. 2 Trucks which have in this instance a wheelbase of 6 ft. 4 in.; diameter of wheels, 33 in.; size of journals, 4¼ by 8 in.

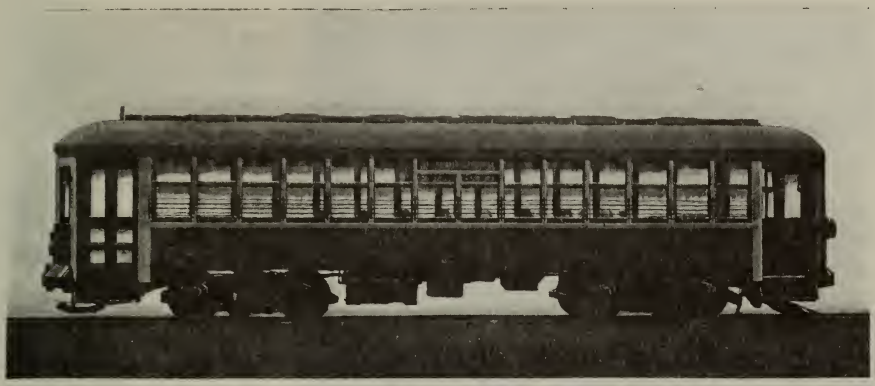
Suburban Cars for the Connecticut Company

SEMI-CONVERTIBLE WINDOW SYSTEM

LAST spring the Wason Manufacturing Company built 46 all-steel semi-convertible cars for The Connecticut Company's city systems in New Haven and Hartford. An article describing these cars appeared in the March, 1916, issue of BRILL MAGAZINE. Thirty additional cars of the same type were recently completed and were followed by 10 suburban cars generally similar in structural design and seating plan, but instead of 12 windows to a side, as in the



SUBURBAN CARS FOR CONNECTICUT CO. The load is borne by the plate girder sides. Attaching the crossings and diagonals to the 6-in., leg of angle sills avoids use of gusset plates

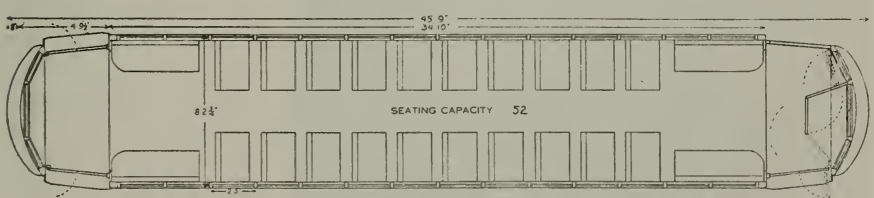


SUBURBAN CARS FOR CONNECTICUT CO. The ten cars are equipped for single-end operation but can readily be adapted to double-end operation by installing door at left of front platform; rear platform has entrances at both sides

city type, the suburban cars have 14 windows and the platforms of the latter are shorter.

The underframe of the suburban cars is of light construction as the weight of car and load is carried on plate girder type of side walls. Angle side sills, 6 by 3½ by ⅜ in., have the wide leg placed horizontally which permits light angle crossings and bar diagonals to be riveted to the sills without gusset plates. The end sills are composed of ¼-in. plate bent into the form of a Z and connected at the corners by ¼-in. gusset plates of generous dimensions. Brackets of ½-in. plate attached to the end sills support the 7 by 3½ by ½-in. angle platform knees. Bolsters of the built-up type have 8 by ⅞-in. top plates and 8 by 1-in. bottom plates.

The side construction consists of 30 1/16 by 3/32-in. plates staggerriveted to the side sills and side posts. The plates are reinforced at top with a 3 by ½-in. bar and have light angles midway between the top bar and the sill which angles serve as seat brackets. The side posts are of T section and extend to the 3 by 2½ by ¼-in. angle top plate with the exception of the post in the center which is interrupted by a light channel extending across two windows to provide space for a window sign.



Height from track to underside of side sills, 3 ft. 0 5/16 in.; from side sills over trolley boards, 8 ft. 8 1/8 in.; track to step, 15¼ in.; step to platform, 14 in.; platform to floor, 9 in. (3-in. ramp). Weight of carbody with all air brake and electric equipment installed and ready for service, 22,800 lb.; weight of trucks, 15,660 lb.; weight of motors, 8,340 lb.; total weight, 46,800 lb.



The window sashes are the Brill Semi-convertible type with brass stiles and hinged connection

The plain arch roof is supported on 1½ by ⅜-in. steel carlines which are attached to the angle top plates over each side post; wooden rafters bolted to the steel carlines and intermediate rafters furnish the means for attaching the roof sheathing. The body flooring consists of 13/16-in. tongued and grooved long-leaf yellow pine laid lengthwise and secured to the floor supports and end sills; this is covered, except for the aisles, with a second flooring of the same material and the aisles are covered with a matting of maple strips. A ramp of 3 in. starts at the end sill at each end and extends in a distance of about 4 ft. 6 in.

The front vestibule is fitted with manually-operated two-leaf folding doors fitted with rubber buffers. As the cars are designed for single-end operation, but may be changed later to double-end operation, the front vestibule is sheathed on the left side in a manner which will enable doors to be installed at a minimum of expense. In this vestibule a separate compartment composed of folding partitions is provided for the motorman. The rear vestibule has folding doors on each side. Both vestibules are equipped with drop sashes. With the exception of the two center windows which have destination signs above, the side windows are equipped with Brill semi-convertible sash of the tandem type. The sashes have brass stiles and center rails and mahogany top and bottom rails. Mahogany is also used for the doors and is stained inside and painted outside; the upper panels of the doors are of clear glass and the lower panels are glazed with wire glass. Mahogany is used for the interior finish with 3/16-in. composite material for wainscoting below the window sills; the same material is used for the headlining, the latter being tinted ivory white.

Twenty cross seats of the reversible-back type and longitudinal corner-seats, the latter accommodating three persons each, provide a seating capacity of 52. The arrangement leaves ample space near the doors to facilitate ingress and egress at heavy traffic points.

Included in the equipment are a motorman's seat, fare box, push button signal system, foot gongs, sand boxes, fenders and track scrapers.

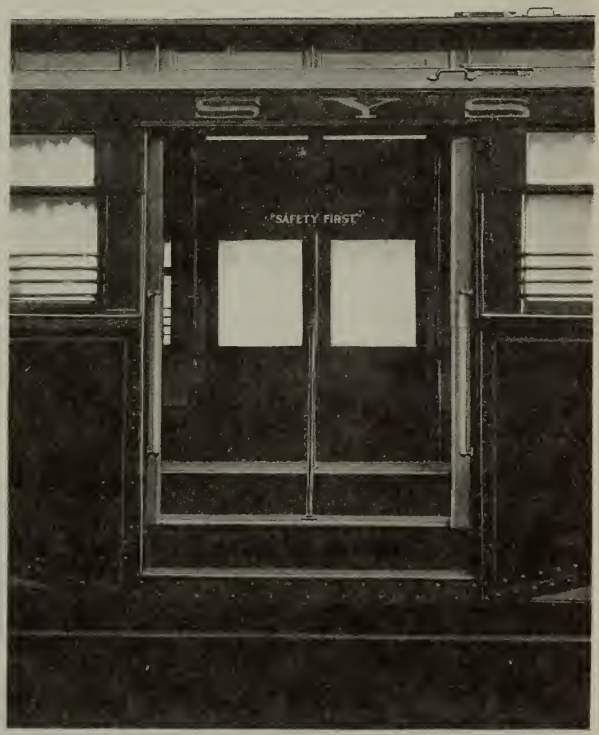
Large Center-Entrance Cars for San Francisco-Oakland Terminal Railways

BRILL 27-M. C. B. TRUCKS

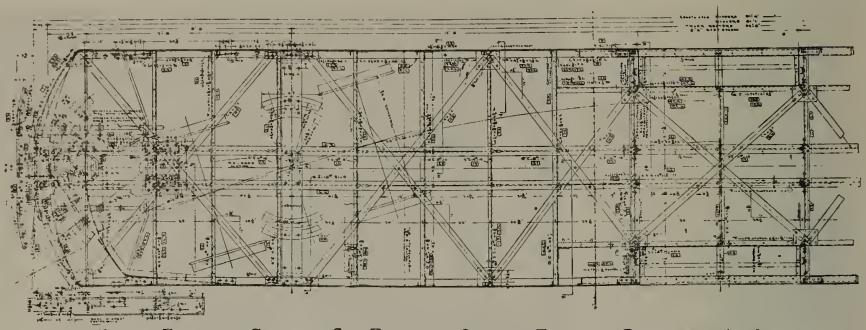
TWELVE cars of the type illustrated were lately placed in service on the Key Division of the San Francisco-Oakland Terminal Railways, the unique route which, combined with a ferry operated by the same company, connects Oakland, Berkeley and other suburbs of Oakland with San Francisco. A section of the lines is built out into San Francisco Bay for several miles upon a 200-ft. wide fill with masonry walls, and for ½ mile on a trestle which terminates in a large ferry house, and this section is operated at high speed. On the mainland, city streets are traversed to the terminals, reducing the speed and calling for frequent stops.

A description of the system appeared in the July, 1916, issue of BRILL MAGAZINE. An article describing 30 steel center-entrance city cars for the San Francisco-Oakland Terminal Railways will be found in the March, 1917, issue. The Key Division cars and the city cars of the San Francisco-Oakland Terminal Railways were built by the American Car Company.

Hitherto the cars employed on the Key Division have been of the end-platform type; these new cars



The step heights are as follows: track to step, 15½ in.; riser, 11½ in.; to floor, 10¾ in.

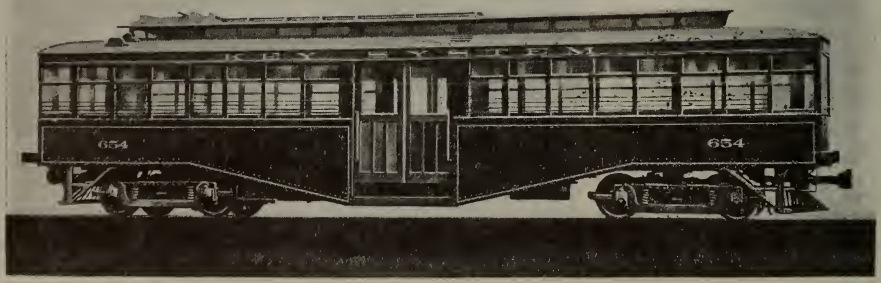


CENTER-ENTRANCE CARS FOR SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS. Angle side sills and I-beam center sills are the principal longitudinal members of the underframe. The sides are of plate girder construction

are the first to have center platforms. The reduction of time which the new type effects over the old, together with re-routing the lines and instituting a new express schedule, is expected to cut down the running time between the Oakland and Berkeley terminals from 30 to 15 minutes.

The underframes have as their chief longitudinal members 6 by 3½ by ⅜-in. angle side sills and 8-in. I-beams. Channel crossings alternating 6 in. and 3 in. in size are connected to the center sills with corner brackets. Built-up bolsters of open-truss construction, bent down at the ends and lipped under the side sills, have 9 by 1-in. top-plate and 9 by 1¼-in. bottom plate. The arrangement of the diagonals will be seen in the framing diagram.

In the side construction a plate girder is formed of ⅛-in. plate riveted to the angle sill, to an angle at the top and to T-posts and channel door posts. Compensation for interrupting the plate girder construction at the side doors is obtained by framing the doors with 9-in. channels and with angles riveted into channel construction in the section of the top panel which spans the doors. The T-posts are 1¾ by ¾ by ¼ in., and extend to the top of the letter panel which is composed of No. 16



All twelve cars are equipped with multiple-unit control and have train doors. They are mounted on Brill 27-M.C.B. 2 Trucks

gauge steel, 8¾ in. wide, and riveted at the top to a light angle. Steel carlines reinforce the wooden carlines of the monitor deck. The two carlines nearest each end of the car are of suitable dimensions to properly support the pantograph trolley standard on the lines.

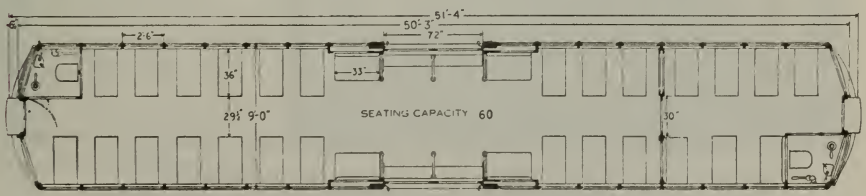


Brill "Renitent" Posts are an important feature of the interior equipment The upper sashes are stationary and are framed continuously from door post to corner post

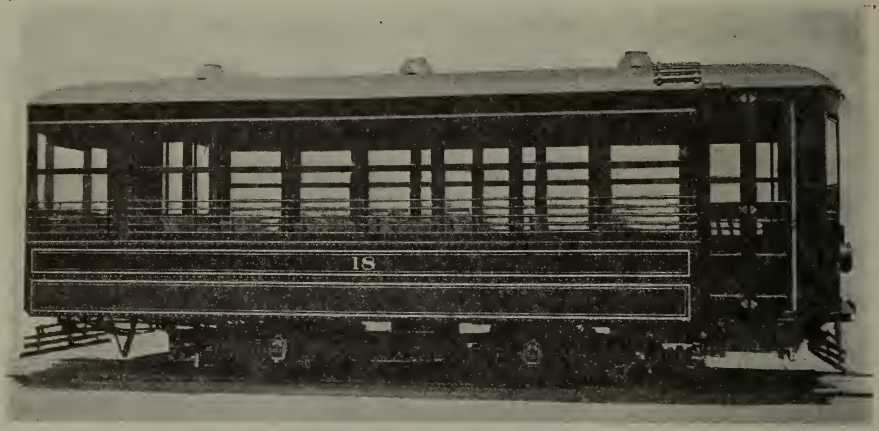
As the illustrations and floor plan clearly show the division of the car into smoking and general compartments, the seating arrangement, the cabs at the diagonal corners, and the door and step arrangements, these will not be described in detail. The Brill Renitent Posts are an important feature of the construction. As they are of spring-brass and form the runways for the lower sashes the sashes may be removed or inserted without tools and by simply grasping at the top and bottom and pressing sideways; they also make the sashes interchangeable. Renitent posts were furnished in the 30 city cars built for this company. The upper sashes are stationary and are framed continuously from door post to corner post, the top rail being capped by flanging the lower edge of the letter panel.

The partitions, doors, window sashes, ventilator sashes and other wooden parts of the interior finish are of mahogany, and the ceilings and wainscoting are of 3/16-in. composite material. Brill "Winner" seats with 18-in. backs and corner grab-handles are the same as are used in the city cars.

The trucks on which the cars are mounted are of the Brill 27-M. C. B.-2 type with 6-ft. 6-in. wheel base and provided with 34-in. diameter wheels.



Height from bottom of sill at bolster to top of monitor roof, 9 ft. 8 5/16 in.

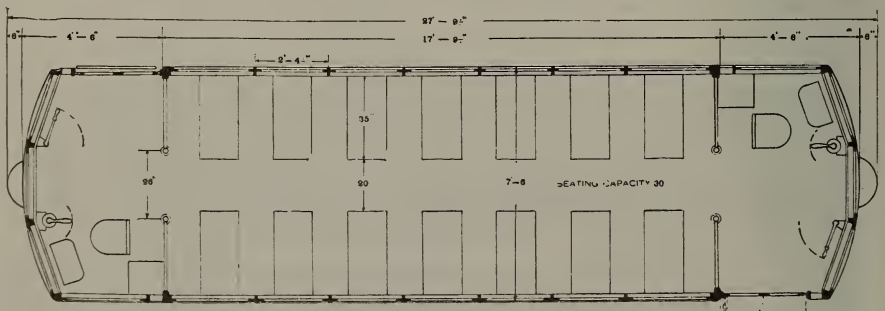


Three of these one-man, light-weight cars, equipped for double-end operation, are the first of their type to be used on the Ironwood-Bessemer lines

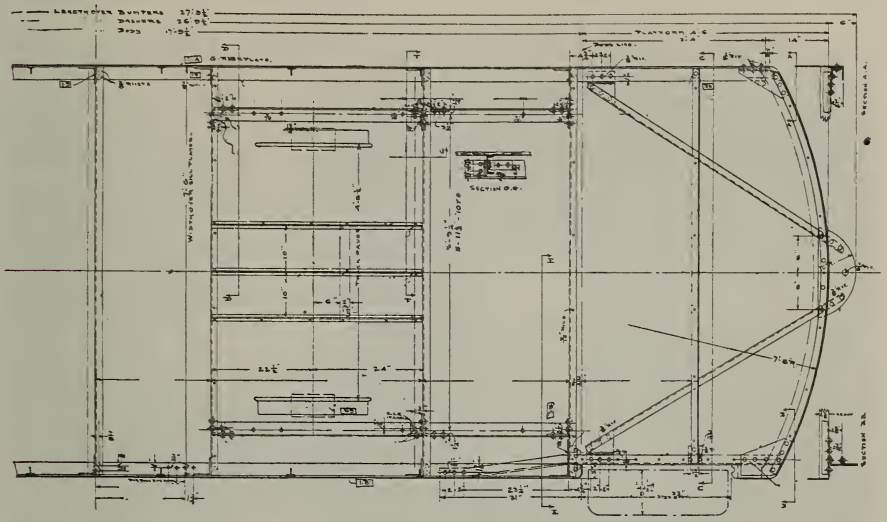
"Safety Cars" for Ironwood & Bessemer Railway

BRILL LIGHT-WEIGHT 21-E TRUCK

IN the northwestern corner of Michigan, at the center of the rich iron ore belt which extends through the regions of Michigan and Wisconsin bordering on Lake Superior, are the fast-growing little cities of Ironwood and Bessemer. They are ten miles apart and are on two steam trunk lines which parallel each other at this point. Several years ago the infrequent steam service became inadequate to meet the demands of travel between the two cities and the towns along the route, and from the opening of the 12-mile electric line, the enterprise has met with much success so that 12 motor cars are now operated. The system is owned and operated by the Ironwood & Bessemer Railway & Light Company which does



Height from track to underside of sills, 22 5/16 in.; from underside of sills over trolley boards, 8 ft. 1 1/8 in.; from track to step, 15¼ in.; to platform, 12 1/16 in.



"SAFETY CARS" FOR IRONWOOD & BESSEMER RAILWAY. Standard underframe of the double-end "Safety Car." Plate-girder side construction

a general lighting and power business in addition to the railway.

During the past month three new cars were received from the American Car Company which enabled a new schedule to be put in force to take care of the increased summer business. These are Birney light-weight "Safety Cars" and have controlling apparatus at both ends arranged for one-man operation. The safety features, from which the cars get their name, have been described in BRILL MAGAZINE in some of the recent articles on cars built by the American Car Company for Lincoln, Kansas City, Wichita, Seattle, Madison, Fort Worth and a considerable number of other cities. Briefly the safety system consists of a pneumatic connection of the brakes, sanders, and doors with the controller handle so that in case of danger the motorman has only to let go of the controller handle to automatically cut off the



The lower sashes raise their full height. The upper sashes are stationary and are framed continuously from door post to corner



"SAFETY CARS" FOR IRONWOOD & BESSEMER RAILWAY. By merely lifting his hand from the controller handle the motorman cuts off the power, starts the sand flowing, applies the brakes and opens the doors

power and make the shortest emergency stop possible to a sanded track and quick-acting brakes, and, at the same time, open the doors.

To secure the lightest construction consistent with durability and maintenance, this type of car, which has been standardized by the designer and the builder, has nothing in its make-up or equipment but what is essential to strength, comfort, and appearance. Bulkheads, side linings, and ceilings are omitted and the floor, posts, seats, and other parts, although not sacrificed to lightness, are designed to eliminate all unnecessary weight.

The sides are composed of plates of No. 16 gauge steel riveted to angle sill, top bar, seat rest angles, T-section side posts, and angle corner posts; letter panels of No. 20 gauge steel are riveted to the posts and flanged at the lower edge to form a cap for the top sash frames.

The side sill angles of 3 by 3 by 3/16-in. and cross sills of 3-in. channels, together with truck sills for mounting on Brill 21-E truck, form the underframe. Outside knees of 6-in. channel and center sills of 3-in. channel support the platforms.

The vestibule posts, the side post sash runways, ribs, rails, headers, etc., are of white oak, and the doors, sashes and moldings are of cherry. The roof is sheathed in 5/16-in. poplar covered with 16-oz. canvas. Six Brill "Exhaust" ventilators are placed in pairs on the roof. Seven Brill light-weight reversible back seats are on each side of the car; the cushions are 15 in. wide and the backs 17 in. high; length over all, 32 in. The side sashes are double with the bottom sash arranged to raise 26 in. in the clear.

Storage Battery Cars for Matanzas, Cuba

BRILL 21-E TRUCK

THE November, 1916, issue of BRILL MAGAZINE contained an article on 12 closed cars of the storage battery type built for the Yumuri, Matanzas & Bellamar Railway of Matanzas, Cuba, by The J. G. Brill Company. Recently several storage battery open cars were shipped to the same company and are of the 8-bench type with bulkheads separating the end benches and four reversible-back benches between. Battery compartments occupy the space beneath all seats and are made to hold 58 cells. According to the profile of the lines on which they will be operated this battery gives the cars a range of about 70 miles, with 8 stops to the mile, on a single charge. The profile shows a maximum grade of 7½ per cent.

The trucks selected for this service are the Brill 21-E type built with a wheel-base of 7 ft. 6 in., and equipped with 30-in. wheels. The track gauge is 4 ft. 8½ in. and shortest radius curve 37 ft. 7½ in.



STORAGE BATTERY CARS FOR MATANZAS. Length over bulkheads, 15 ft. 8 in.; over platforms, 23 ft. 4⅜ in.; centers of side posts, 2 ft. 8 in.; width over sills, 6 ft. 3 in.; over posts at belt, 7 ft. 0½ in.; extreme width with steps down, 8 ft. 1¾ in. Height from track to underside of sills, 2 ft. 1⅛ in.; from underside of sills to top of roof, 8 ft. 5¾ in.; track to step, 16⅞ In.; step to floor, 15¼ in. Seating capacity, 40

Long-leaf yellow pine side sills, oak crossings and crown-pieces constitute the light but strong underframes. Ash side posts of 2¾-in. thickness and corner posts 3⅝ in. thick have a sweep of 5 in. Steel carlines ⅝ in. thick reinforce the roof which is of monitor type and is fitted with wire glass set without sashes in the deck framing. One-piece side guards are held up under drip rails by gravity catches.

BRILL CAR AND TRUCK SUPPLIES

Anti-climbers
Axles
Bearings, Truck
Bells, Signal
Bolsters, Truck and Body
Bolts, Nuts and Washers
Brake Adjusters
Brake Beams
Brake Handles, Ratchet
Brake Hangers
Brake Systems and Parts
Brake Wheels, Vertical, Ratchet
Brooms, Snow Sweeper
Bumpers, Car
Bumpers, Seat
Bushings, Case-hardened and Bronze
Castings, Brass and Composition
Cord, Bell, Register and Trolley
Cord Connections and Couplers
Couplers, Car
Curtains and Curtain Fixtures
Doors and Door Fixtures
Door Controllers
Door Operating Devices
Fenders and Wheel Guards
Forgings, Car and Truck
Gates, Car, Pantograph and Screen
Gongs, Platform and Roof
Grab Handles
Guards, Car
Journal Boxes
Pinion Pullers
Pins, Case-hardened
Posts, Car, Metal and Wood
Rattan, Twill-woven
Register Fixtures
Roofing, Car
Sanders, Track
Sashes, Car, Metal and Wood
Sash Fixtures
Scrapers, Track
Seats, Car
Seats, Conductors'
Seats, Motormen's
Seat Parts
Springs, Car and Truck
Steps, Car
Step Operating Devices
Straps, Car
Trimmings, Car
Ventilators, Car
Vestibules, Car

BRILL PATENTED SPECIALTIES FOR CARS

Winner Seats
Renitent Post
Folding Gates
Mutually-operating Door Mechanism
Vestibule Door Controller
Wason Open Car Folding Step
Narragansett Open Car Step
Round Corner Seat End Panels
Exhaust Ventilator
Retriever Signal Bell
Dedenda Alarm Gong
Radial Draw Bar
Angle Iron Bumpers
Dumpit Sand Box
Track Scraper
Ratchet Brake Handle
Ratchet Brake Wheel
Brake Chain Slack Adjuster

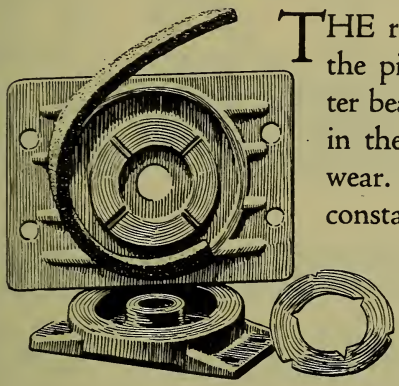
BRILL PATENTED TRUCK SPECIALTIES

Half-Ball Brake Hanger
Oil Retaining Center Plates
Journal Box
Graduated Spring System
Bolster Guide
Side-Swing Dampener

RECENTLY PUBLISHED BULLETINS ON BRILL MOTOR TRUCKS

Light-weight 21-E, single-truck, Bulletin 231
21-E, single-truck, Bulletin 220
Radiax, non-rigid, single-truck, Bulletin 219
39-E, one-motor, double-truck, Bulletin 227
76-E, two-motor, double-truck, Bulletin 225
77-E, two-motor, double-truck, Bulletin 228
27-M. C. B. interurban passenger, Bulletin 224
50-E, interurban freight, Bulletin 221

REDUCING FRICTION AND COSTS



THE ring, shown at the right of the picture of our standard center bearing, is placed in the recess in the lower plate and takes the wear. Being phosphor-bronze and constantly covered with oil the friction is practically nil. About a gill of oil put in once a year gives ample lubrication and is sealed from dust by a strip of felt. The device is known as the Brill Oil-Retaining Center Bearing.

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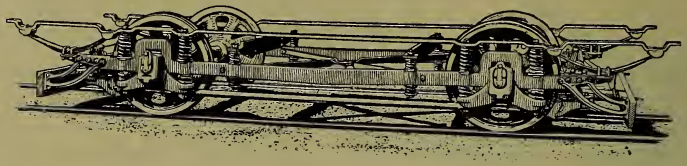
ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158, Buenos Aires

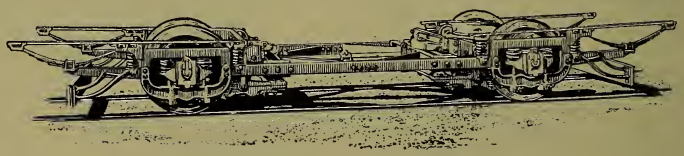
NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

STEADIER RIDING CARS



SUPPORTING the frame of the 21-E Truck on wide-apart springs in Brill "Wide-Wing" Journal Boxes gives a longer spring base to the frame and thus enables the frame to give a longer spring base to the body. The result is a steadier riding car and a more strongly supported car. The "Light-Weight 21-E" also has "Wide-Wing" Journal Boxes.

ON FIFTY RAILWAYS

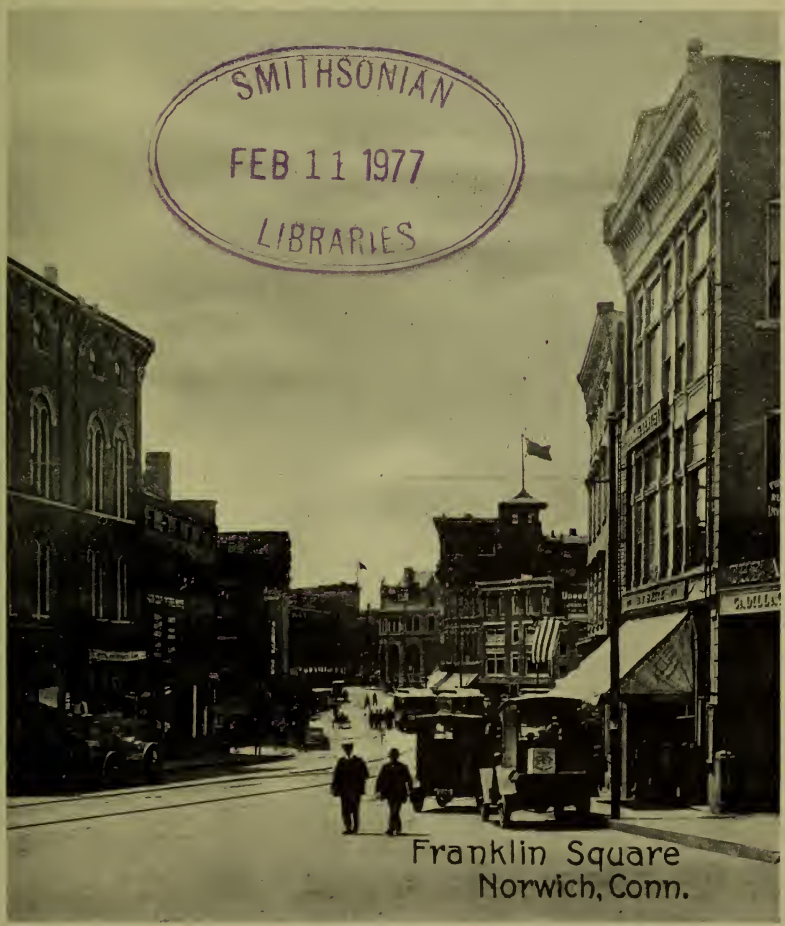


BACK of our word that the "Radiax" rides smoothly and gives excellent service under cars that are too long for the wheel-base of rigid-axle trucks and too short for pivotal trucks, is the fact that fifty different railway companies are operating "Radiax" Trucks and a good proportion have ordered second and third lots.

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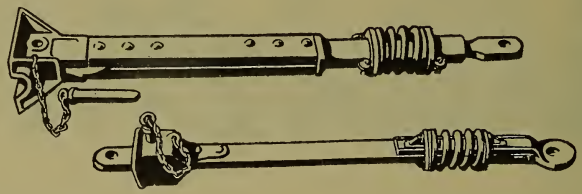
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BRILL MAGAZINE



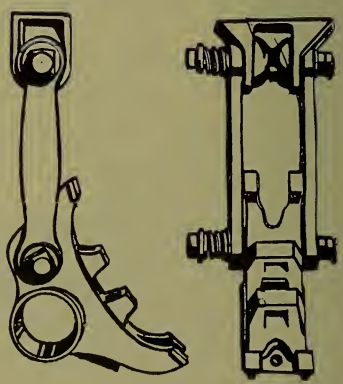
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To Make Ends Meet

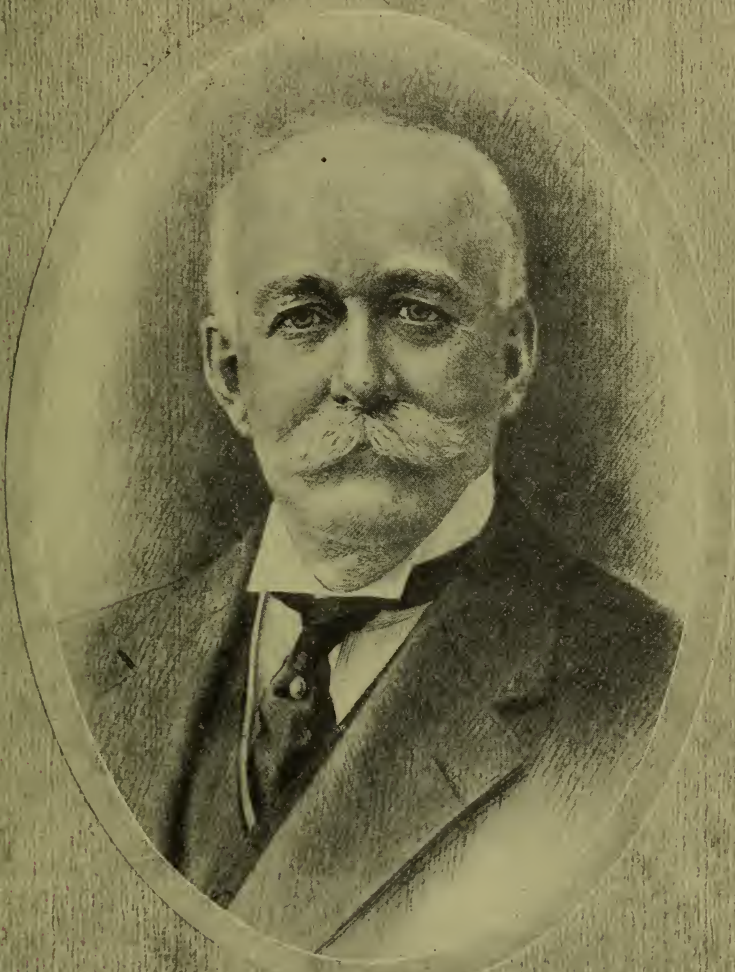


A FLAT bar for cars measuring under 30-ft., over corner posts and a channel bar for cars over that length; a malleable iron draw head and a single spring keyed on a slide to cushion both drawing and buffing shocks, is the simple make-up of the Brill Radial Draw Bar, a powerful and efficient coupler for general service.

On All Brill Trucks



HOLDING the large bearing surfaces of the half-ball ends of the forged hangers snugly in their socket castings by springs takes up any wear that may develop. Wear is almost nil because the wear is on smoothly machined surfaces which are case-hardened. The Half-Ball Brake Hanger is self-cleaning as well as noiseless.



J. H. Harrington

Think straight and clear.

Make a game out of your work.

Never give orders—give instructions.

Never quarrel with the public—show them.

The greatest dividend in human life is happiness.

By force of will make your work yield pleasure to you.

Good humor is absolutely essential to good mental health.

Never fight corporations. Harness them to public service.

Given the will to learn, life and industry are better than all the colleges in Christendom.

The valuable man in this world is the one who can do what the great army of men cannot do.

I believe that brains do not count so much as inspiration and the determination to do things.

Get a man to believe in you, get the public to think a certain way, and you have unloosed a dynamo of power.

The man who is opinionated or ill-tempered or prejudiced does not try to think straight, but seeks only evidence to bear out his already formed opinions.

When a business enterprise starts out, it should always be with the idea of making a greater contribution to the public than the profits it may derive.

—Henry L. Doherty.

BRILL MAGAZINE

VOL. 11—NO. 7
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JULY 15, 1917

HENRY EDWARDS HUNTINGTON

HENRY EDWARDS HUNTINGTON was born in Oneonta, N. Y., February 27, 1850. He was educated in the public schools and entered, at an early age, the local hardware store of his father and uncle. This uncle was Collis P. Huntington, who became the noted railway financier and builder of the Central Pacific Railroad, the first continental railway connecting California with the east. In a few years he went to New York, where he continued in the hardware business, and at 21 years of age his uncle sent him to St. Albans, West Virginia, to take charge of a lumber business furnishing ties for railroads. At 30 years of age he became Superintendent of Construction of the so-called Huntington Lines between Louisville, Kentucky, and New Orleans, which it was the aim of his uncle to incorporate into a single transcontinental railway system, and a great part of this work was carried out under his direct supervision. In 1884, he was made Superintendent of the Kentucky Central Railway, then Receiver, and finally Vice-President and General Manager. In 1886, he was appointed Vice-President and General Manager of the Elizabethtown, Lexington & Big Sandy Railroad and the Ohio Railway. In 1892, he was chosen Assistant to the President of the Southern Pacific Company, of which he became Second Vice-President in 1900, and later First Vice-President. He was also President of the Southern Pacific Railroad of Arizona and New Mexico, Carson & Colorado Railroad, and Market Street Cable Railway of San Francisco. In 1900, Collis P. Huntington died, leaving his residuary estate to his widow and to his nephew. Mr. Huntington then went to Los Angeles, where, with a few associates, he had bought street railway properties, which became the nucleus of the immense system of electric railways serving that section of California. In 1910, when he retired from active management, the system he had developed consisted of the Los Angeles City Railway and the Pacific Electric Railway, which comprised over 700 miles of trolley lines in and around Los Angeles and connecting the city with the coast. During this decade the population of Los Angeles, which was 100,000 in 1900, was more than trebled. Mr. Huntington was a Director in many corporations and organizations, at one time nearly sixty in number, and inherited from his uncle a half-ownership in the Newport News Shipbuilding and Dry Dock Company, which employs between 7,000 and 8,000 men.

Interurban Centers and Interurban Cars

NORWICH, CONNECTICUT



NORWICH is a manufacturing city of about 30,000 population, situated in the eastern part of Connecticut, at the head of navigation on the Thames River, fifteen miles from the seacoast. The city is built on several hills and is chiefly on the high ground between the valleys of two small rivers which unite and form the Thames River. Textiles, cutlery, firearms, paper, electrical supplies, printing presses, etc., are manufactured here, and the steady growth and additions to its diversified manufactures are due to its excellent transportation facilities by land and sea, abundance of water power, good and plentiful labor, and ample capital. The city is served by the New York, New Haven & Hartford and the Central Vermont Railways, and by steamboat lines to New York.

Norwich is the center of the Shore Line Electric Railway System, which alone serves the eastern part of the state with electric railway transportation. As will be seen by the accompanying map, it extends northward to Webster, Mass., eastward to Westerly, R. I., and westward to New Haven. The main lines, with their branches, comprise a trackage of about 250 miles and have a tributary population of approximately 300,000. The terminal cities of the lines and their populations are: Norwich, 30,000; New London, 20,000; Westerly, 10,000; New Haven, 135,000.



A car barn of the Shore Line Electric Railway System on Central Avenue, Norwich

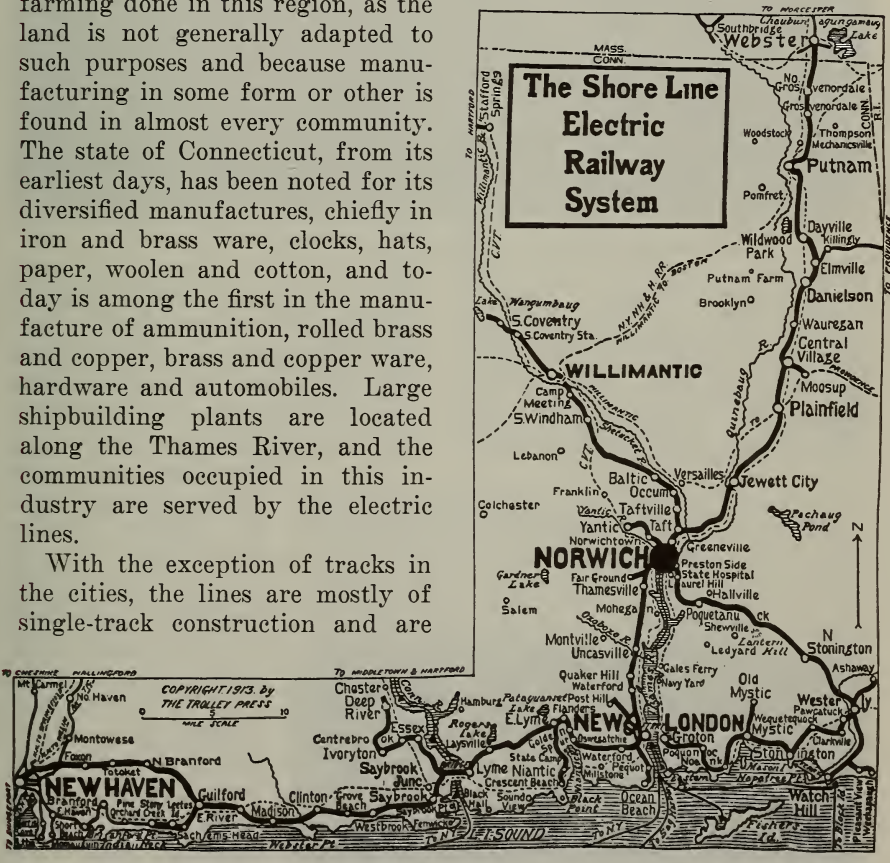
The southern section of the system from Westerly to New Haven for most of its distance skirts the coast of Long Island Sound, and this picturesque coast, with its many little harbors and fine beaches, is thickly dotted with summer cottages and many

fine estates, and attracts a large summer population. The country of all the eastern section of the state is of gently rolling character, with many low wooded hills and frequent water courses. The Connecticut River is wide and navigable, and is crossed near its mouth by the electric railway bridge, and at New London a ferry makes the connection across the Thames River to Groton.

There is comparatively little farming done in this region, as the land is not generally adapted to such purposes and because manufacturing in some form or other is found in almost every community. The state of Connecticut, from its earliest days, has been noted for its diversified manufactures, chiefly in iron and brass ware, clocks, hats, paper, woolen and cotton, and today is among the first in the manufacture of ammunition, rolled brass and copper, brass and copper ware, hardware and automobiles. Large shipbuilding plants are located along the Thames River, and the communities occupied in this industry are served by the electric lines.

With the exception of tracks in the cities, the lines are mostly of single-track construction and are laid partly on private right-of-way and partly on the highways. The lines form the central link in the trolley route between New York and Boston, connections with other systems being made at New Haven and Danielson.

The Shore Line Electric Railway Company furnishes its own current from power plants at Danielson, Thamesville, New London, Saybrook, Hallville and Mystic; five of these plants are operated by steam



Interurban Centers and Cars. The Shore Line Electric Railway System comprises about 250 miles of trackage and alone serves the eastern part of Connecticut with electric railway transportation



INTERURBAN CENTERS AND CARS. Bridge at Quaker Hills between Norwich and New London

and one by water power. The substations are located at Putnam, Danielson, Plainfield, South Windham, Thamesville, New London, Waterford, Saybrook, Guilford, White Rock and Mastuxet Brook. The current is transmitted at 11,000 volts and put on the lines at 600 and 1,200 d. c. The system is equipped with overhead trolley.

A total number of 152 passenger cars are available for operation on the lines and from 100 to 125 are used in normal traffic. The latest type of car is one that will probably be standard on the system for some time to come, because of its suitability to the various forms of service on the different divisions. This car was described in the June, 1915, issue of BRILL MAGAZINE, just



Waiting Station at State Hospital between Norwich and Westerly



INTERURBAN CENTERS AND CARS. Trestle over steam railroad and highway at William's Crossing between Norwich and Williamantic

after ten had been delivered by the Wason Manufacturing Company. The bodies are framed and sheathed with steel, the side construction being of the plate girder type and having the Brill semi-convertible window system. The floor is ramped 3 in. from the bolsters to the end sill at each end, to reduce the height of the platform steps. The cars have a seating capacity of 52 and are 45 ft. 5 in. long over the vestibules, 47 ft. over the bumpers, 24 ft. from center of bolsters, and are 8 ft. 2 in. wide over the side sheathing. The weight of a car body, including brakes and electrical equipment, is 11 tons; total weight of car and trucks, fully equipped, 23 tons. The trucks are of the Brill 27 M.C.B.-1 type, equipped with four 40 to 50 h. p. motors per car. The



Taft's Station between Norwich and Williamantic

cars are equipped with multiple unit control, as they are operated in trains as well as singly. Outside of the city the cars are operated at a maximum speed of 30 miles per hour.

The method of fare collecting is the "copper zone" or mileage basis. An interesting illustrated description of the "copper zone" system as applied to the Shore Line Electric Railway will be found in the *Electric Railway Journal* of March 18, 1916, page 567.

During the past year the traffic statistics of the company show that 18,804,165 passengers were carried, and 4,643,440 passenger car miles operated.

Throughout the entire Shore Line System merchandise of all kinds is handled, in carload lots or small parcels, the service being quite independent of the passenger service.

At many points physical connection is made with the steam roads, and standard cars are, by electric motor cars, delivered to points along the electric lines.

At New Haven a union freight station offers opportunity for transfer to and from the Connecticut Company, making it possible to ship to and from practically all towns and cities in the State. Quick and economical service is maintained.

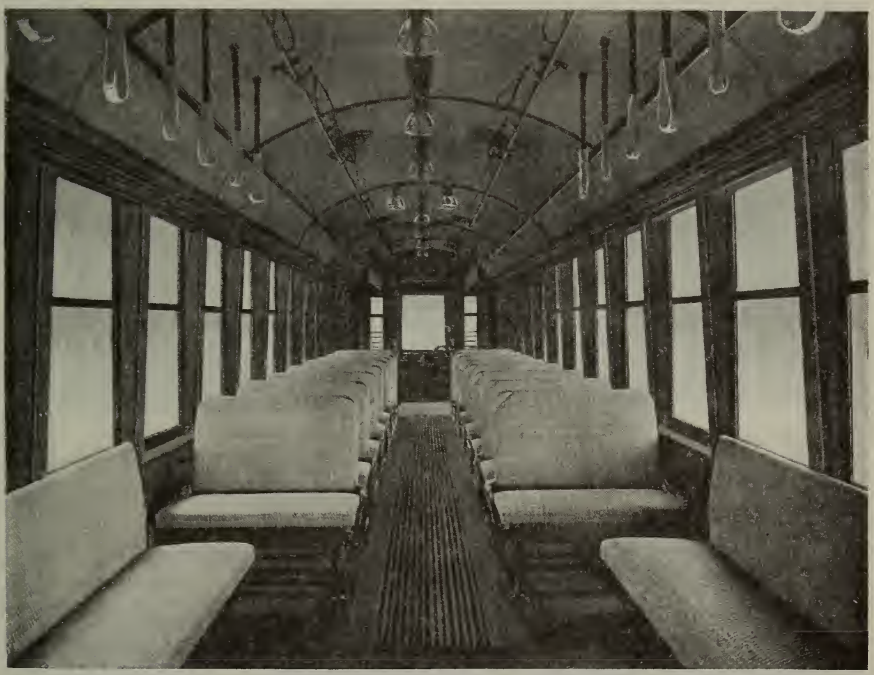
At New London the freight terminal includes a storage warehouse of large capacity for the use of patrons of the road. There are two tracks extending into this building, with accommodations for four cars under cover. Directly in front of the building, connection is made



INTERURBAN CENTERS AND CARS. Tunnel between Norwich and Jewett City



INTERURBAN CENTERS AND CARS. Fifty-two passenger steel car, the latest standard of the Shore Line Electric Railway System. Mounted on Brill 27-M.C.B.-1 trucks



The Brill Semi-convertible Window System adapts the cars equally to summer or winter service

with the tracks of the N. Y., N. H. & H. R. R. and with the Central Vermont or Grand Trunk System.

Suitable freight facilities are provided at all points of consequence throughout the system, and that this department of the business is appreciated is evidenced by increased tonnage that calls for constant increase in equipment.







Cars carrying wounded from railway station to hospital. Stretchers placed transversely of car. Transportation of shells from factories where made to other factories to be filled and sent to front. Many five-car trains are employed to transport workers to and from factories.

The Tramways and the War

THE photographs on the opposite page show how one of the large tramway systems in a French city is being utilized for military purposes. This city is one of those to receive the greatest number of wounded soldiers, and it was here that one of the first schools was established for teaching new means of livelihood to those unfitted by their wounds to resume their regular occupations.

The railway company has put in operation several three-car trains made up of two motor cars with a trailer between. These cars are provided with stretchers, which are placed over the seats transversely of the car. Since the outbreak of the war the company has always had a certain number of these trains ready, day and night, at the disposal of the military authorities.

In this same city are extensive ammunition plants where shells are manufactured in large quantities. The output of these factories has been expedited very materially by the use of platform cars hauled by motor cars and conveying shells from factories where they are made and machine-finished, to other factories where they are filled and made ready to send to the front. The motor cars are each equipped with four 50 h. p. motors and haul four flat cars having a capacity of 40 tons.

Another valuable service of this tramway company is the transportation of workers to and from the munition factories of the city. Arrangements are made to have on hand at the opening and closing hours of the working days a sufficient number of cars to accommodate the workers. For this purpose many five-car trains, consisting of a double-truck motor with four trailers, each train having a capacity of 300 passengers, are employed. With these, and a larger number of two and three-car trains, the tramway company has been able to cope with the situation in a manner satisfactory to all concerned.

Car sashes should be regularly inspected to forestall moisture from getting into the joints and causing serious injury. When needed apply a heavy coat of color mixed with a generous amount of finishing varnish.



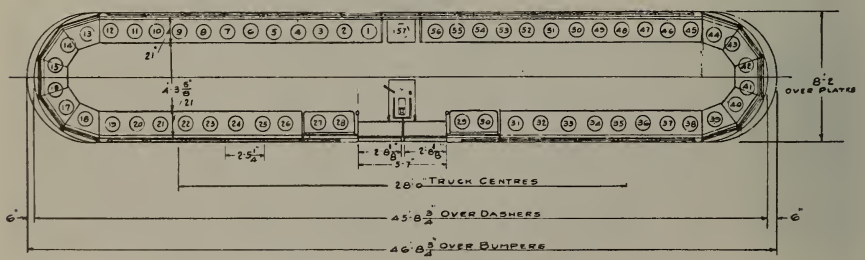
The center-entrance trailer car has proved a success in relieving rush hour congestion on the busiest sections of the Detroit United Railways

100 More Cars for Detroit United Railways

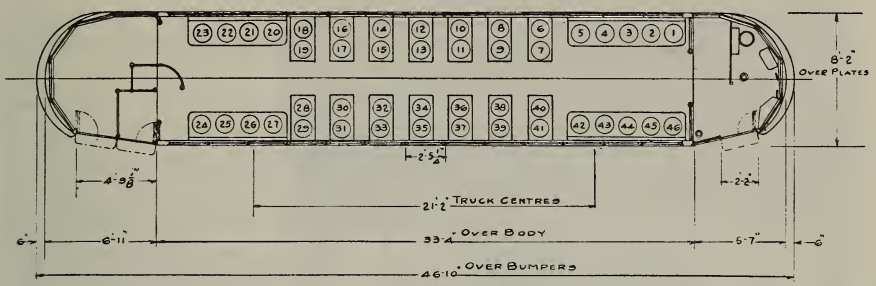
BRILL RENITENT POST WINDOW SYSTEM

CENTER-ENTRANCE trailer car operation was commenced in Detroit early in 1916, and has had the expected results of largely eliminating the traffic congestion during the rush hour periods. Supplemented by 50 new cars of the same type and practically the same details, and by 50 motor cars lately delivered by The G. C. Kuhlman Car Company, the Detroit United Railways Company has been able to expand its service and quicken the schedules on certain busy divisions.

The trailer cars are built on all-steel underframes made up of angle side sills, I-beam crossings and built-up plate bolsters. The ends are of semi-circular form with channel bumpers and drawbar sills. The plate girder sides are composed of 3/32-in. steel plates, reinforced at the top with pressed steel belt rail and riveted to 2 by 1½-in. T-posts. The top plate is of angle with letter board riveted thereto and having its lower edge pressed out to form a capping over the upper sashes,



Height from track to underside of side sills, 1 ft. 9¾ in.; height from underside of side sills over roof, 8 ft. 11¾ in.; height from floor to center of headlining, 8 ft. 3⅞ in.; track to step, 13 in.; step to platform, 10¼ in.; ramp in floor, 3¾ in.; weight of carbody, including air equipment, 17,480 lb.; weight of trucks, 8,300 lb.; total weight, 25,780 lb.; seating capacity, 57



DETROIT UNITED CARS. Height from track to underside of side sills, 2 ft. 9⅜ in.; height from underside of side sills over trolley boards, 9 ft. 3¼ in.; height from floor to center of headlining, 8 ft. 3⅞ in.; track to step, 13 1/16 in.; step to platform, 13 in.; platform to floor, 11¾ in.; weight of carbody without electrical equipment, but with seats, 16,800 lb.; weight of trucks, 15,320 lb.; total weight of body and trucks, 32,120 lb.; seating capacity, 46

which are framed in a continuous section from center door post to corner post. The ends are framed in the same manner as the sides.

The motor cars are also built on steel underframes with 5 by 3 by 5/16-in. angle sills and end sills of pressed steel with flanges turned on the bottom and riveted to the side sills; the crossings are of 3-in. I-beams and bolsters of built-up truss type. The outside knees of the platforms are of 7 by 3½ by ½-in. angles, the drawbar sills of 5 by 4 by ½-in. angle, and the bumpers of channel section. The entire side of the car, including the side sill angle, forms a girder by which the entire load is transferred to the bolsters. Side plates of 3/32-in. steel, pressed steel belt rail, angle top plate 3 by 3 by ¼ in., and ⅛-in. letter panel plate; these, together with 2 by 1½-in. T-posts comprise the side girder.

The roofs of both trail and motor cars are of the monitor type, supported on 1½ by ⅞-in. steel carlines sandwiched between white ash carlines; the intermediate rafters are 1½ by ⅞-in. ash. Removable hoods are framed with ash bows and carlines; hoods, side roofs and monitor roof are



The new cars are almost identical with former lots and have the "Detroit Platform" which has been a feature of this type for many years



Both the trailer and motor cars have Brill Renitent Posts

sheathed with yellow poplar, covered with No. 6 canvas laid in white lead.

The windows of both types of cars are the same and have upper sashes framed in continuous sections applied to the outside of the posts and capped over the top by a projection from the letter panel. The lower sashes raise their full height in the spring-brass runways of the Renitent posts. The end sashes at both ends of both types of cars are arranged to drop into pockets, with the exception of the right-hand sash at the forward end of the motor cars, which is stationary. Window guards at the side are of the two-rod type, with vertical spacers at the center of each window opening.

Entrance doors are made of white oak, glazed with plate glass in the upper panels and clear wire glass in the lower. Each pair of rear doors at the entrance of the motor cars is connected with a step immediately below, so that both may be operated either separately or in unison with the other pair of doors. The doors are arranged to be securely locked in either open or closed positions. The exit door at the front has the same arrangements as the rear doors. The doors are provided with grab handles arranged to be on the inside when the doors are closed. The rear platform has a one-inch pipe railing separating entrance and exit passageways.



Longitudinal corner seats for four passengers each at rear and five passengers at front leave wide aisles at car ends and reduce congestion

50 Center-Entrance Motor Cars for Boston, Mass.

BRILL RENITENT POSTS

DURING the last two years the Boston Elevated Railway Co. has put in service 100 center-entrance trail cars built by The J. G. Brill Company. Fifty motor cars of similar type and construction and of about the same dimensions have lately been shipped to Boston and will be operated dur-

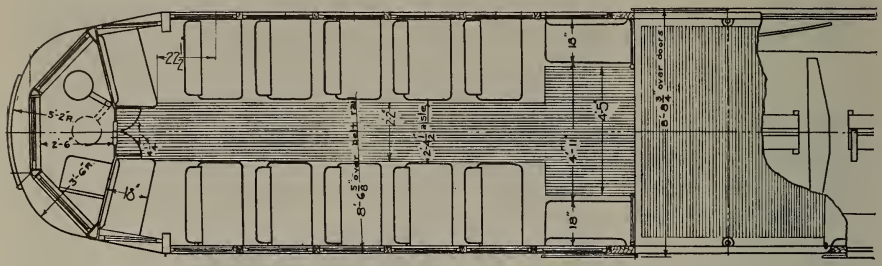


These motor cars have the same general appearance as the trailers which have been in operation on the Boston lines for two years

ing the rush-hour periods in conjunction with the center-entrance trailers. They are equipped with multiple-unit control.

The motor cars, like the trailers, are built with plate girder sides designed to carry the entire load. By placing the bolsters under the middle of each half of the car, the weight is balanced on the trucks; hence the strain at the center is reduced and the necessity for heavy construction around the center doors avoided. The trailers have a seating capacity of 62 and the motor cars have a seating capacity of 56, the reduction of seating space in the latter being caused by the motorman's cabs at each end.

Steel side plates of 3/32-in thickness are riveted to continuous angle sills depressed 18 in. at the center of the car to provide for the low center platform; a 3½-in. bar reinforces the top of these plates, light angles serve as seat supporters and, to stiffen the plates, T-posts are riveted to the plates and spaced at 2 ft. 6-in., centers. Pressed steel channels are employed for the crossings and are attached to the angle sills without gusset plates, as the sills are set for this purpose with the wide leg placed horizontally. The riser at each side of the center platform is a pressed steel Z-shape member. The construction of the ends of the underframe differs from that of the trailer car under-

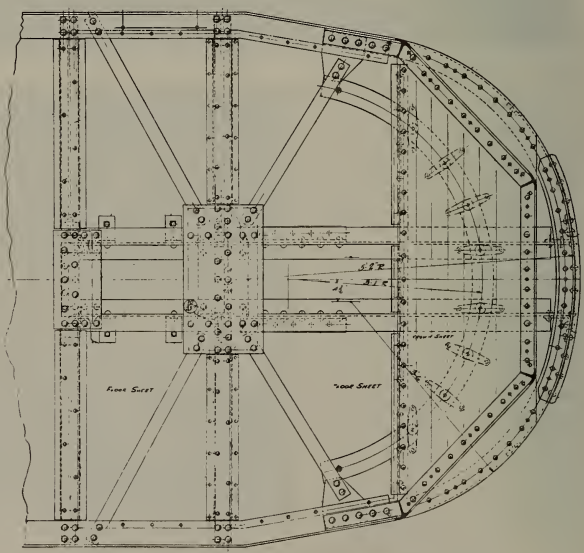


CARS FOR BOSTON. Length of body over end posts, 47 ft. 5 in.; length over anticlimbers, 48 ft. 9½ in.; length of center platform, 6 ft. 6 in.; centers of side posts, 2 ft. 6 in.; width over posts at belt, 8 ft. 5 in.; extreme width over side doors, 8 ft. 8¾ in.; height from track to underside of side sills at bolsters, 2 ft. 4⅞ in.; height from underside of side sills at bolster over trolley boards, 9 ft. 1$\frac{31}{16}$ in.; from platform to car floor, 10$\frac{3}{16}$ in. Seating capacity, 58. Wheel base of trucks, 5 ft. 6 in.; diameter, 24 in. Weight of carbody less electrical equipment, 17,270 lb.; electrical equipment, 1,383 lb.; air brake equipment, 1,027 lb.; trucks, 9,300 lb.; motors, 6,920 lb.; total weight, 36,000 lb.

frame to provide resistance to hauling and buffing strains in train operation. This end construction is shown in the accompanying diagram.

To give clearance for operation in subways the side posts incline inwardly 4 in. on each side. The post heads are riveted to an angle which serves as the top plate and to which a furring strip is bolted to serve as an attachment for the car lines.

Brill Renitent posts, which, by the way, had their initial use in the trailer cars built in 1915, for the Boston Elevated Railway Co., are also used in the new cars, even for the vestibule posts, which in the trailer cars were faced with wood. For the benefit of those who are not acquainted with the Renitent post it may be briefly stated that this feature consists of a spring-brass casing surrounding a T-post; the arrangement calls for a stationary upper sash and the lower sash is made water-proof and rattle-proof by the spring runway, and is enabled to be inserted or removed



Interesting method of bracing end of underframe to resist hauling strains

without tools. In the trailer cars the five windows ending at corner posts are framed in one section. This construction has been superceded in the motor cars by steel framed individual sashes secured to overlapping steel plates which are riveted to the posts.

Pipe stancheons at the center platform, headers at the end of the monitor deck, and light steel trusses nearly over the bolsters, support the wooden roof.



CARS FOR BOSTON. These cars, like the trailer cars, are equipped with Brill Renitent Posts. Above belt line the sides are inclined inwardly 4 in. for clearance in subways

From the thresholds of the center platform the floor is ramped 1¾ in., to the center, and from the riser at each side there is a ramp of 4 in., for a distanece of 4 ft. 9 in. This enables the height from track to threshold to be but 14½ in., and the height of the risers 9⅝ in.

Pneumatically operated sliding doors are hung from an overhead track and have guides and rollers at the bottom. These doors are made to conform to the inclined shape of the sides of the car. The upper part of the doors is glazed with plain glass and the lower with clear wire glass. To compensate for the light construction of the doors, three reinforcing rods in each door extend from top to bottom.

As the side windows are arranged to be raised their full height, window guards of wire mesh set in stout pipe frames are provided for passengers' protection.

Straight grained mahogany is employed for the interior finish and the rafters, the inside of the monitor roof and the side-roof head-linings are painted white. The transverse seats are of the Brill Winner type and have cherry cushions and backs stained mahogany.

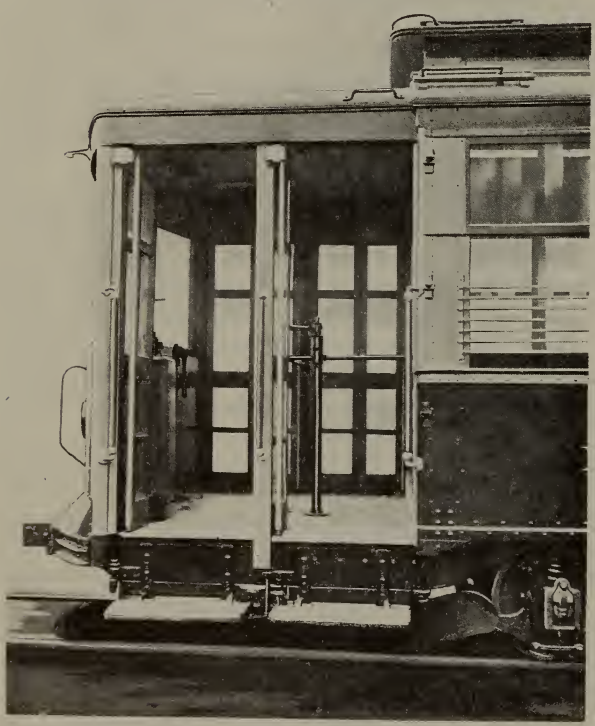
Each end of the car is formed into a motorman's cab by a partition with two swinging doors at the center, corresponding in height to the top of the seat backs, by steel panels which drop into pockets at the back of the stationary seats and by a curtain which fills the space above the swinging doors. The arrangement is simple, light and durable.

Steel Cars for Cedar Rapids & Marion City Railway, Iowa

BRILL 77-E TRUCKS

TEN cars recently received by The Cedar Rapids and Marion City Railway Company of Davenport, Iowa, from the American Car Company have unusually short bodies. They have seating accommodations, however, for 40 passengers and have long platforms. The generous platforms and the fact that the cars are carried on 24-in. wheel trucks makes the loading and unloading rapid and safe.

The cars are built with plate girder sides in which the plates are 3/16 in. thick; the angle sills, 4 by 3 by 5/16 in.; the top bar, 2 by ¼ in. The underframes have 7-in. channel sills, 4-in. channel crossings, and 9 by ¾-in. plate bolsters of the riveted channel box type. The outside platform sills are composed of 7-in. channels and the drawbar sills of 4-in. channels; 2 by ¼-in. bar diagonals extend from corner to corner of the platforms. Channel section bumpers are faced with anti-climbers. In the upper structure the top plate is composed of a 2 by 2 by 3/16-in. angle, which is riveted to the No. 16 sheet steel letter panel. Steel rafters support the monitor deck and are bolted to the top plate over the top of each post.



The doors are operated separately or in pairs by the builder's standard door operating device

The flooring is of single thickness tongue - and - groove yellow pine depressed in the aisle so that the top of the floor mats is on a level with the top of flooring under the seats.

The upper window sashes are stationary



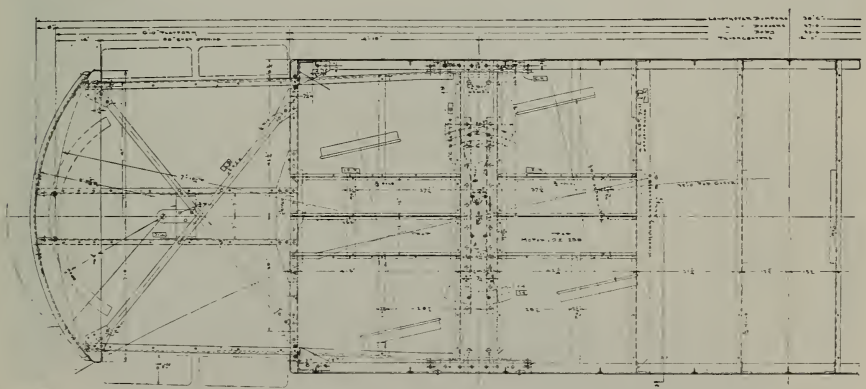
CEDAR RAPIDS & MARION CITY CARS. Ten of these 40-passenger steel cars were built by the American Car Company and mounted on Brill 77-E-1 Trucks

and made in a continuous frame from corner post to corner post. The lower sashes have bronze channel stiles and are arranged to be raised their full height in the spring-brass runways of the Brill Renitent posts.

At each end of the car the vestibule sashes are fitted with storm sashes on the inside in such a manner that they can be readily removed. All the vestibule sashes are arranged to drop into pockets.

As will be seen by the illustration of the interior, bulkheads are omitted and headers with pipe stanchions employed instead. The vestibules have wooden posts dividing the openings into two parts, and each set of doors is of the two-leaf type, one hinged to the vestibule corner post and the other to the center post. A simple system of mechanical levers opens and closes the two doors and their steps separately or in unison.

Quartered oak is employed for the interior finish, including vestibule doors, moulding, sashes, etc. The inside lining of the car below the window rail is of ¼-in. composition board, painted to match



Channel end sills and crossings tie the angle side sills together. The load is transmitted to the bolsters by the plate girder side construction



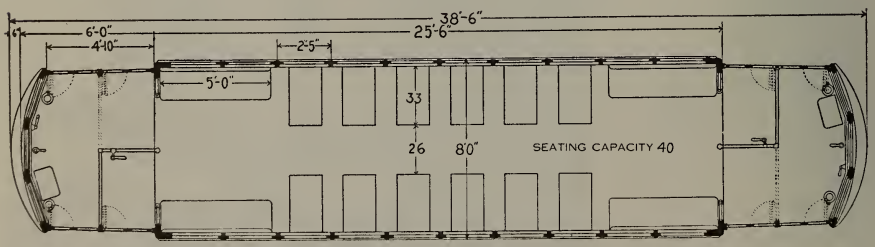
Cedar Rapids & Marion City Cars. Brill Renitent Window Posts provide spring-brass runways for the lower sashes

the interior finish of the car.

Included in the equipment are Brill "Dedenda" platform gongs, "Radial" drawbars, track scrapers, and other patented specialties, and the cars are mounted on Brill 77-E-1 Trucks, which have a wheel-base of 5 ft. 1½ in.; diameter of wheels, 24 in.; size of journals, 7 by 3¾ in. The trucks are arranged to enable the cars to operate on curves of 35-ft. radius. The cars were wired by the builder and mounted on trucks with motors and complete electrical equipment, air-brake apparatus, heaters, etc., installed and tested and the cars made ready for operation on arrival at the railway shops in Cedar Rapids.

The railway company operates 27½ miles of lines in and between Cedar Rapids and Marion. The former city has a population of about 40,000 and ranks among the first cities in industrial and commercial importance in the state of Iowa and is one of the principal steam railway centers of the region. Marion is a rapidly growing town of about 8,000 population and the country between the terminals is a rich farming section with a considerable population within walking distance of the lines.

The company furnishes its own current from a well-equipped steam power plant in Cedar Rapids and operates at a trolley voltage of 600 v.



Height from track to underside of side sills, 26 1/16 in.; from underside of side sills over trolley boards, 8 ft. 7¾ in.; from floor to center of head lining, 6 ft. 7 5/16 in.; from track to step, 13 in.; step to platform, 12 in.; platform to floor, 7 in. Truck wheel base, 5 ft. 1½ in.; diameter of wheels, 24 in.; size of journal, 7 by 3¾ in.



Length of car over anti-climbers, 46 ft. 7¼ in.; distance between truck centers, 32 ft. 3½ in.; from end of body to center of derrick mast, 4 ft. 6 in. Cars to be mounted on motor trucks with 6 ft. 6-in. wheel base

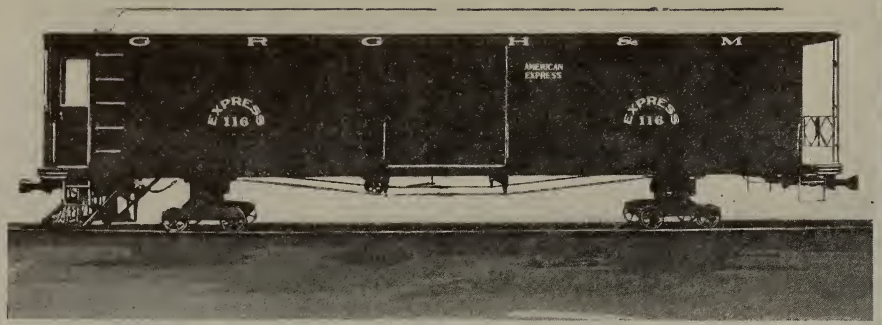
Work Cars for Boston Elevated Railway Company

AMONG recent shipments made by The J. G. Brill Company to the Boston lines were several steel-framed work cars and flat cars, of which one of the former is illustrated herewith.

The chief members of the bottom frame of the work cars are fish-belly side sills made up of ⅜-in. steel plates, 22 in. wide in the deepest part and reinforced at top and bottom with 4 by 3 by ½-in. angles. The center sills and crossings consist of I-beams and the bolsters are of built-up open truss type. T-posts with diagonal bracing, angle top plates, and steel rafters comprise the framing of the superstructure. M. C. B. standard North Carolina pine is employed for the side and end sheathing. The cars are designed for a load of 45,000 lb., exclusive of a load of 3,000 lb., on the derrick mast. The derrick has a capacity of 1,500 lbs. at a distance of 20 ft. from the center line of the mast. The car frame is strongly braced to resist strains from the derrick.

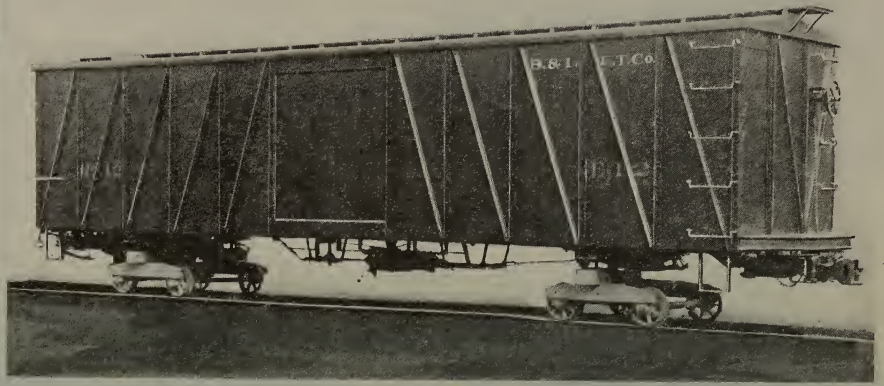


There are two 4-ft., wide sliding doors on each side and 3-ft., sliding doors at each end









Latest type of express car for Grand Rapids, Grand Haven & Muskogee Railway. Length over bumpers, 50 ft.; truck centers, 29 ft.; opening of side doors, 7 ft. Capacity of car, 50,000 lb.

Steel freight cars for trailer service on the Buffalo & Lake Erie Traction lines. Inside length, 36 ft. 0½ in.; length over bumpers, 40 ft. 9¾ in.; truck centers, 24 ft. $0\frac{5}{16}$ in.; width of door opening, 6 ft. To be mounted on Brill 55-H trailer trucks. Weight of body, 17,940 lb. Capacity of car, 50,000 lb.

Interesting Types of Express and Freight Cars

A NUMBER of modern types of steel express and freight cars have lately been shipped by The G. C. Kuhlman Car Company, and among them a lot of three motor cars for the Grand Rapids, Grand Haven & Muskogee Railway, which are for single-end operation and have a vestibule at the front and a 4-ft. open platform surrounded by a railing and gate at the rear end. With the exception of the floor, roof and vestibule sashes, the cars are entirely of steel. Sliding doors are provided at the center of the car at both sides and have clear openings 7 ft. wide and 7 ft. high.

The cars are built on underframes consisting in the main of 6 by 3½ by 5/16-in. angle side sills; bolsters of truss form steel channels with top and bottom plates bent down at the ends to come under the side sills; and end sills made up of a truss frame of angles and channels. Diagonals extending from the bolsters serve as center platform knees and are reinforced with angle gussets at the end sills. The cars are equipped with MCB couplers and mounted on high-speed trucks with 7-ft. wheel base and 36-in. wheels.

Another recent shipment was of three steel box freight cars for the Buffalo & Lake Erie Traction Company. On this system freight is handled by both motor cars and trailers. The trailers are left at different stations from Erie to Buffalo and are loaded with freight of all kinds from points east of Erie and west of Buffalo. Baggage cars equipped with four 75-hp. motors, MCB couplers and automatic air brakes each haul from one to three trailers.

A motor car leaving Erie in the morning frequently hauls three trailers loaded with freight and these are side-tracked at different stations along the route where freight is consigned. After they are unloaded they are reloaded again and picked up by the next motor freight car going in their direction. This method enables the trailers to be unloaded and reloaded without holding up motor cars. Approximately a two-hour freight service schedule is maintained.

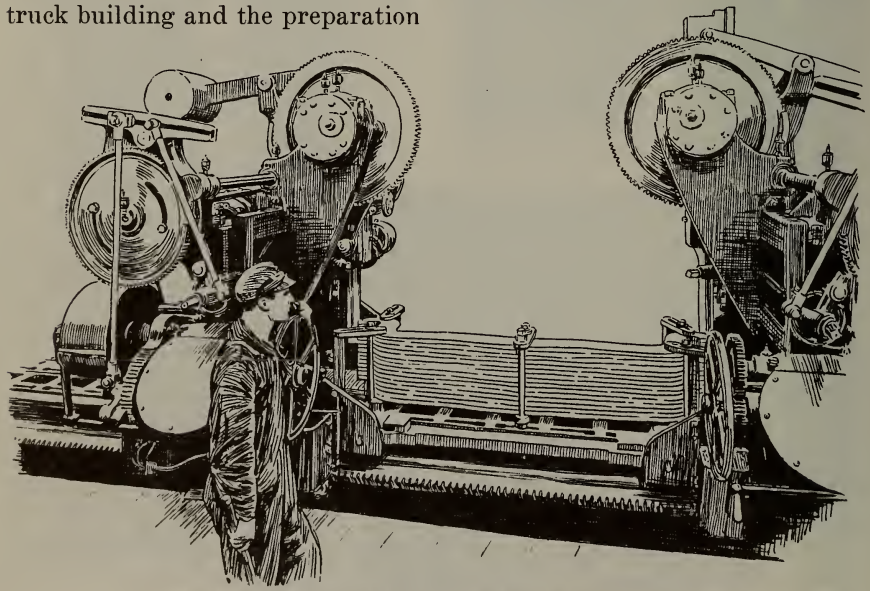
These cars have angle side sills, I-beam crossings, pressed diaphragm bolsters, channel draw bar sills, extending from bolster to bumper and channel bumpers with outward extending flanges. The sides are of steel, braced in the manner usual to steam railroad freight cars and forming, with sill and truck plate, a plate girder. Four-inch channels are employed for the uprights and compression diagonals, and 2 by 2-inch angles for the tension diagonals. On the inside of the side framing and riveted to all members, is a 3-32-inch plate. Angle car lines with wood fillers support the roof, which is of yellow pine, covered with No. 8 canvas.

How Brill Trucks are Built

A BROAD section of floor space of the center bay of a wide steel building, which is a part of a line of buildings extending one-third of a mile through the center of the Brill plant at Philadelphia, is occupied by the Truck Assembling Department, where from 30 to 40 trucks for the various classes of city and interurban service may be seen in process of construction at one time. On the ground and second floors of the side bays on both sides of this space are machines for cutting, drilling, planing, milling, etc., material as it comes from the nearby forge shops. The large amount of glass in the high roof and sides of the building gives the abundance of light necessary for accuracy in both truck building and the preparation of truck parts. The cranes and other equipment of the building are very complete and facilitate handling of material and finished trucks in the most expeditious manner.

Each truck is assembled by two men, a truck builder and his helper. They are powerfully built men, usually of large physique, as the handling of the heavy parts and the steady guiding of the pneumatic reamers call for more than ordinary strength. Their tools consist of a pneumatic drill, a pneumatic chisel, heavy special wrenches and hammers.

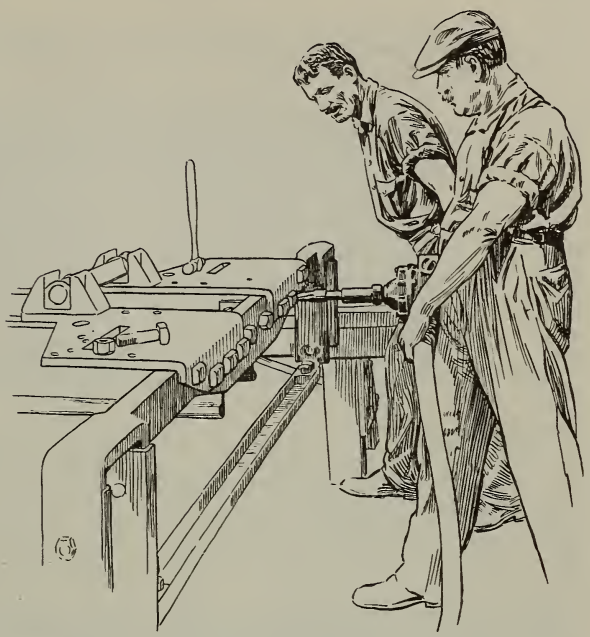
Certain parts of the truck, such as the side bars with their pedestal gibs or wear plates and tie bars, the bolster with its center plates



Double-head slotter finishing a stack of equalizing bars for Brill interurban trucks

and side bearings, the transoms with their corner brackets, the brake beams with their shoe-heads and lever holders, and the spring plank with its elliptic spring seats, are bolted or riveted together and delivered with the rest of the material on the floor ready for the truck builder to assemble into a truck.

When the truck builder starts to put a truck together he first sets the side frames on trestles in proper relation to each other. Next the transoms are placed in position and connected to the side frames with temporary bolts, and the gusset plates are placed over the side frames and transoms and bolted to each with temporary bolts. Temporary bolts also are used to connect the end frames to the side frames. The truck is then "squared" by measuring crosswise at the gibs or pedestal wear plates, and diagonally between the inside corner of the gibs that are attached to the outside pedestals. The gibs of each pair of pedestals are gaged to make sure they are parallel vertically. The method of "squaring" the truck frame is simply loosening the temporary bolts until the various members are in correct alignment with each other. The use of sledge hammers and levers to force the parts into alignment without loosening the temporary bolts is not permitted, as it is liable to spring some part out of place enough to make it react later and force the frame out of square after the truck has gone into service.



Bolting up the frame temporarily then taking out one bolt at a time and reaming the holes for "body-bound" bolts is the Brill method of securing side frames to transoms and end frames

The next operation is to remove the temporary bolts, one at a time, ream the holes and replace the temporary bolts with "body-bound" bolts. A "body-bound" bolt is a trifle larger than the reamed hole and both bolt and hole are slightly tapered so that when the bolt is driven in place its body is bound tightly all around and thus these bolts are able to bind solidly together the forged steel gusset

plates, side frames and transom corner brackets. The holes in which the temporary bolts are placed are drilled in the Preparation Department and are aligned accurately enough for the temporary bolts, but it is impossible to drill them accurately enough for the permanent "body-bound" bolts and, therefore, these holes must be reamed out to provide an absolute fit. After the frame bolts or "body-bound" bolts are in place the truck is again measured for squareness.

Next comes the installation of the bolster suspension apparatus which differs according to the type of truck, the short-base pivotal trucks having links over the side frames and the interurban trucks having links suspended from pins over the bolsters and having bearings on the transoms. The springs are now put in place, excepting trucks having equalizing springs which are installed with the equalizing bars when the truck is mounted on the wheels and axles. Next in order is the mounting of the motor suspension bars with their springs on the end frames, or attaching them to the transoms, according to whether the motors are inside or outside-hung. The brake rigging is then attached to the gusset plates by means of brake hangers, which hangers and brake-holders are assembled beforehand and installed as a unit at each wheel. The brake beams are then put in place, after which the vertical levers are attached, and, in case of trucks with inside hung motors, the horizontal levers are connected and release springs, lever slides, etc., installed.

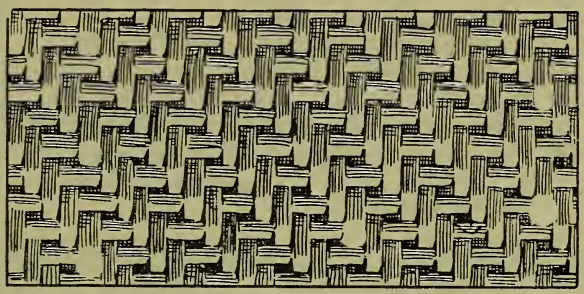
The truck builders are now finished with their part of the work. A crane lifts the truck off the floor and carries it to another part of the shop where it is mounted on wheels and axles, to the latter of which the journal boxes have been applied. The axles are turned on lathes, and wheel treads finished and the wheels placed on the axles in a department in the same shop. The last operation is the placing of the brake shoes in the brake shoe heads and adjusting the brakes by the bottom truck connections.

Just outside the shop and near to where the trucks are loaded on flat cars or sent to the car shops over the trolley tracks which connect all the shops of the Brill plant, is a hydraulic machine, under which the trucks are tested by subjecting them to a pressure on the center plate equal to the weight of the carbody and its equipment and live load. This is to check the height under maximum load. The step height of the car without any load is then determined by decreasing the pressure until it equals the carbody and its equipment only.

CHANGES OF ADDRESS

THOSE who receive BRILL MAGAZINE are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.

Good-Looking and Long-Wearing



RATTAN seating material as woven at the Brill Works is a close, twill fabric made of tough, glossy rattan, which, either lined or unlined, can be scrubbed without injury. It is made in all widths from 18 to 36 inches.

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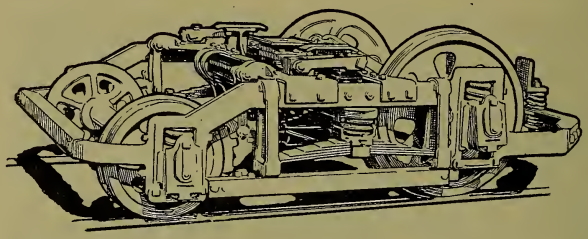
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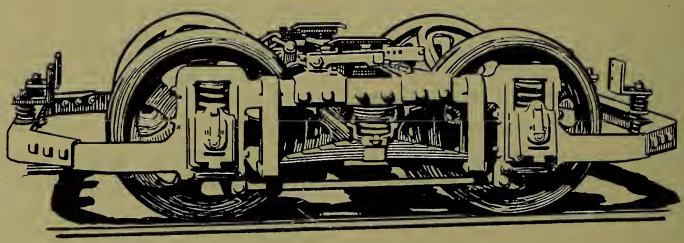
NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

UNDER MOST CITY CARS



THERE must be some very good reasons why the 39-E Single-motor Truck is built in larger numbers than any other in the electric railway field. The spring system with the Brill Graduated Springs and Floating Bolster give a singular smoothness to its riding. The solid forged side frames give squareness and long life.

FOR HEAVY GRADE LINES



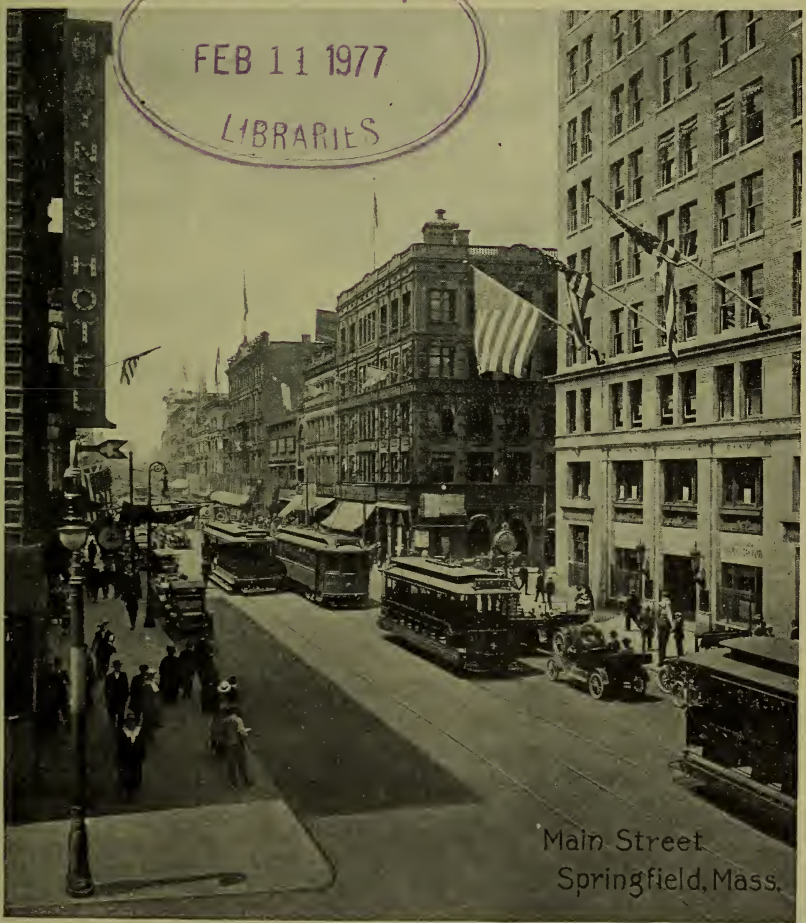
THE only difference between this truck—the 76-E—and the truck at the top of the page is that this is designed for double-motor equipment and is for the service where heavy grades are encountered. The spring system, the brake arrangement, the bolster with its connections, are all the same, hence the riding qualities are equal.

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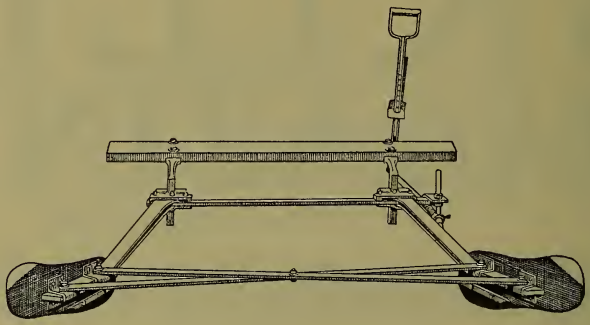
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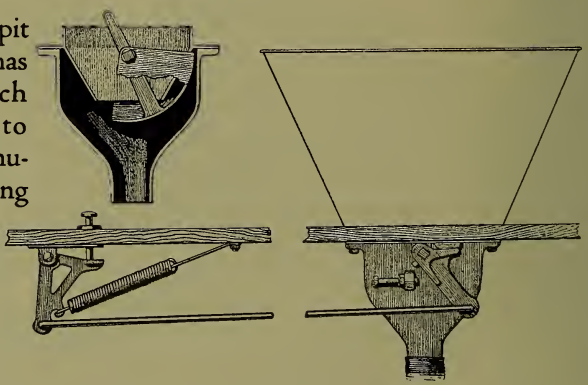
Main Street
Springfield, Mass.

ARMED FOR THE FRAY



THE arms which hold the blades are each made of two pieces of spring steel, springy enough to give at the right times and rigid enough to hold the blades to their work of clearing the rails of leaves, sand or snow. The Brill Track Scraper has removable shoes.

A DEPENDABLE SAND BOX



THE Dumpit Sand Box has a valve which never fails to give a continuous flow as long as there is sand in the hopper. It can't stick because the sand forms its own valve closure in the rounded bottom of the "rocker" (see picture). The double hopper prevents the water which creeps up the sand "wick" in the hose from reaching the sand in the hopper.



THOMAS A. CROSS

President, United Railways & Electric Company of Baltimore

"We are conducting the street railway system in the interest of the public, and we can give a satisfactory and efficient service only if we stand shoulder to shoulder and work in complete and harmonious accord. We ask of the public fair treatment, and in return we must offer the best that is in us in the way of service."

THOMAS A. CROSS.

BRILL MAGAZINE

VOL. 11—NO. 8
Copyright, 1917, by The J. G. Brill Company, Philadelphia, U. S. A.
OCTOBER, 1917

THOMAS A. CROSS

THOMAS A. CROSS, President of the United Railways and Electric Company of Baltimore, has spent practically his life in the street railway business. It was more than a quarter of a century ago that he entered the service of the railways of his city. Coming to Baltimore when a boy from his home in Prince George's County, Maryland, he entered a business house for mercantile training. His tastes were not suited to that sphere, however, and he presently found employment with the old North Avenue Electric Company in the line department. He then became connected with the Baltimore Traction Company as superintendent of overhead lines. With the merging of all the lines in Baltimore he became identified with the United Railways and his ability was recognized by speedy promotion. At the beginning of the present year Mr. Cross was made acting President, and at the annual meeting of the Directors on April 11th last, he was clothed with the title of President. No better word picture could probably be painted of the President of the United than the following from an article in *The News,* of Baltimore, telling of his elevation to the head of the company:

"The new President of the United Railways and Electric Company, who is just plain 'Tom' Cross to his many intimate friends, works as hard as any motorman on the line. His election gave satisfaction to scores of people who know him and was followed by an avalanche of letters of congratulation from all kinds of people. The avalanche was so heavy that Mr. Cross' desk was covered.

"What he did was to root out a clear space and keep right on with his work. He is not, however, the kind of executive who runs things by sitting firmly planted at a desk and calling up and calling down those under him. The trolley cars have a way of going all over the map of the city and suburbs, and in that respect Mr. Cross is very much like a trolley car himself. He is very fond of dynamos, motors, wires and machinery. It was along the electrical line that he entered the service of the company. Asked what he is, he says first 'an electrical engineer' before mentioning that he is head of the trolley system.

"Mr. Cross keeps his ear to the ground to find out what the people of Baltimore think. He also notes very carefully what is being done by trolley lines in all parts of the country. As an advocate of electrical motive power when it was something of an experiment he has rejoiced to see electricity supplanting steam power on railroads. The line from Baltimore to Bay Shore is as long as some railroads and presents some railroad problems. One is the distribution of power. The company is now getting ready to put in block signals to insure safety of operation and to have a sub-power station to distribute the current. The new method of handling the current will mean a saving for the company. The block system will mean an outlay. Both will be a help to the service.

"Mr. Cross is a big, healthy and cheerful fellow. He does not betray his age, and no one would suspect him of having been in the trolley service for 26 years. He started in young, and is still young and willing to learn."

Interurban Centers and Interurban Cars

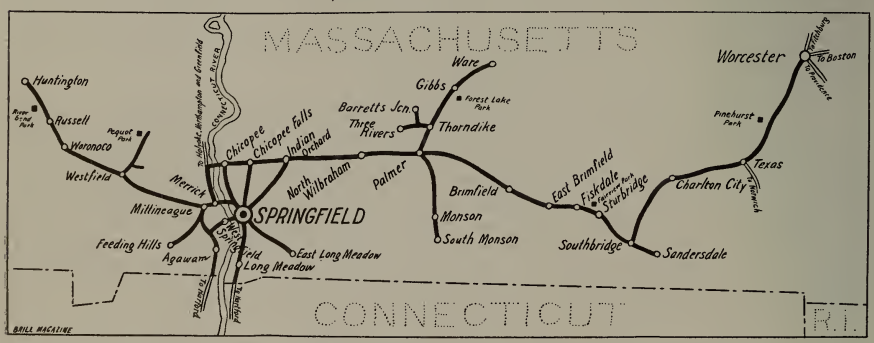
SPRINGFIELD, MASS.



SPRINGFIELD, on the Connecticut River in the broad fertile valley which extends through the center of Massachusetts, is a typical New England city, progressive, thriving, and assured of a large future in its industrial and commercial growth.

While not sharing with Hartford, its next large neighbor to the south, the advantages of river transportation, the head of navigation being at Hartford, Springfield is the converging point of steam railway lines from all directions and is one of the principal points on the main lines between Boston and New York and Boston and the west. It is just 100 miles west of Boston and 25 miles north of Hartford. The population is about 100,000 and growing rapidly. It ranks among the first of New England cities in banking and bank clearings and holds a high place as a manufacturing center. The manufactures are remarkably diversified and include large fire arms, automobile, and paper goods factories, printing and publishing concerns, slaughtering and meat packing establishments. The car and truck building plant of the Wason Manufacturing Company, one of the Brill subsidiary companies, is in the northern section of the city and is one of its oldest industries. Large department stores and wholesale houses give to the business district a more metropolitan character and appearance than is usual to cities of its size.

It is characteristic of the city that it has a splendid central square on which face fine public buildings known as the Municipal Group and which include a campanile of



From Court Square, Springfield to City Hall, Worcester, is 58 miles. Springfield has a population of 120,000; Palmer, 10,000; Worcester, 180,000

excellent proportions. The city is noted for its educational institutions which include a technical high school and high school commerce with a large enrollment of pupils.

Although not an interurban center in the same sense that applies to cities in other parts of the country where the rural population is sparse and the largest cities of the neighborhood become connected with neighboring towns and cities by a network of high speed electric lines usually operated on private right-of-way, Springfield is connected with practically all the cities of the state and with cities in Connecticut and Rhode Island by electric railways, but whose business is more or less local. Through cars are operated between Worcester and Springfield and other cities of the surrounding territory over the lines of the Springfield Street Railway Company and a number of other systems all of which are controlled by the New England Investment and Securities Company. The accompanying map shows the company's local lines giving direct service into Springfield from nearby points and one of its lines to Worcester over which through schedule is maintained. At Worcester connection is made by



Interurban Centers and Cars. Springfield and the Connecticut River from Forest Park south of the city



INTERURBAN CENTERS AND CARS. Court Square at the center of Springfield is the terminus of all interurban lines entering the city



Traffic center in W. Springfield. Lines at right lead to Hartford and at left to Westfield and Holyoke

lines under the same controlling company to all points in that section of the state.

The chief lines connecting with the lines leading into Springfield from up and down the Connecticut River are those of the Connecticut Company from Hartford and points south; The Holyoke Street Railway Company, Northampton Street Railway Company, and the Con-



INTERURBAN CENTERS AND CARS. State Street, Springfield, looking toward business section of the city. Public Library on the right

necticut Valley Street Railway which make connections as far north as Greenfield and Millers Falls nearly 50 miles distant from Springfield.

The principal interurban traffic is between Springfield and Worcester over the lines of the Springfield Street Railway and the Worcester Consolidated Street Railway, a distance of



Long Meadow on line to Hartford. The view is typical of many of the towns of this region



Typical stretch of track on highway between Springfield and Long Meadow
Track and concrete road on the route to Palmer and Worcester



Entering Palmer on line from Springfield
New car barn of the Springfield Street Railway Company



INTERURBAN CENTERS AND CARS. Standard type of interurban car operated on through schedule between Springfield and Worcester



Prepayment car with convertible sides, employed in city and suburban service. Steel construction

about 60 miles from center to center of the terminal cities. The country traversed consists of rolling farm lands well populated in the rural sections and having frequent towns along the route. Palmer has a population of 10,000: Southbridge, 4,600; Sturbridge, 2,225; and the others have less. The central power station is located at Millbury and has a capacity of 20,000 kw. The substations are at Palmer, Sturbridge, Texas, Charlton City, and Worcester. The transmission voltage is at 66,000 v. and 13,500 v. and the line operating voltage is 600 and 650 v.

The cars used for the through service between Springfield and Worcester are of wooden construction with side and end sills reinforced by steel plates made in the form of a Z. A 10-in. steel channel forms the center stringer; angles are used for the crossings and I-beams for the needle beams. The platforms are vestibuled and have folding doors at each side; double sliding doors of regulation type are

(*Continued on page 240*)

"Peter Witt" Cars for Erie, Pa.

BRILL "RENITENT" POST WINDOW SYSTEM

FIFTEEN cars of the "Peter Witt" front-entrance center-exit type have recently been delivered to the Buffalo and Lake Erie Traction Company's lines at Erie, Pa., by The G. C. Kuhlman Car Company. The cars went to their destination on their own wheels and under their own power manned by crews of the lines over which they were routed. The route was as follows: By the Cleveland, Painsville & Eastern lines to Ashtabula; through Ashtabula, over the Ashtabula Rapid Transit tracks; from Ashtabula to Conneaut over the Pennsylvania & Ohio tracks; then from Conneaut to Erie, Pa., over tracks of the Cleveland & Erie.



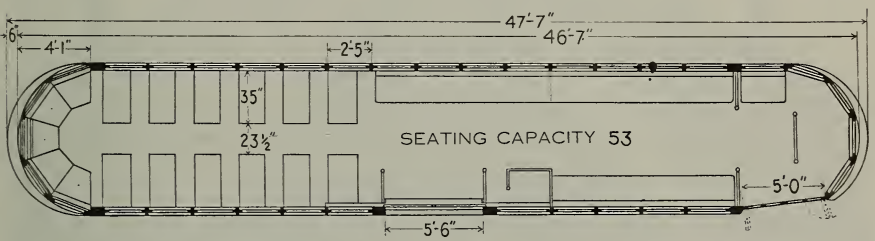
The wide entrance at the front end and the front half serving as a loading platform enables these cars to load quickly at principal collecting points

The city of Erie, which is in the northwestern part of Pennsylvania on Lake Erie, has a population of 100,000 and is served by one street railway system, that of the Buffalo and Lake Erie Traction Company. The city has a rectangular street lay-out, with the principal traffic lines paralleling the waterfront and traversing streets at intervals of several blocks. At the center of the city and at right angles to the waterfront is State Street, where all lines converge, and on this street at three principal transfer points, respectively two and four squares apart, occurs the densest traffic. A large majority of the equipment is of the prepayment type, with the conductor and fare box located on the rear platform. The entrance is at the rear and the exit from both rear and front platforms. Congestion at these principal transfer points has developed to a stage where radical steps were necessary to relieve the situation and it is considered that the new type of car with its large loading space will reduce the stops to an extent that will enable the lines to carry sufficient cars to keep traffic moving without undue congestion during the rush-hour periods. The snow-storms and high winds from

the lake in winter have tended to make the traffic situation difficult, and as travel in Erie is always heavier during inclement weather, the new cars will aid very considerably in relieving the transportation problem during the coming winter and their larger capacity will prevent much of the overcrowding experienced of late. During the summer the cars which are in service on lines reaching parks east and west of the city run on frequent schedules and carry night to cut off reflections from the center window.

The floor plan and photographs give a clear idea of the plan of the car and make it plain how that passengers may swarm aboard and not be held back by fare collection until they reach the conductor's position near the middle of the car.

The floor is ramped from the entrance back to the truck bolsters and at each side of the center exit to obtain low steps at front and side, the step heights being 14 in.



Peter Witt Cars for Erie. Weight of carbody, 14,200 lb.; trucks with gears, 9,480 lb.; motors, 8,080 lb.; total weight, 31,760 lb.

heavy loads on evenings and holidays; this traffic will be greatly benefited by the use of the new cars.

Although in general the new Erie cars are similar to the "Peter Witt" type of cars used in other cities, they differ in some details from the plan of this type used on a number of systems, the most important difference being in the width of the front entrance. The 5-ft. entrance of the Erie car enables three persons to enter at the same time. Another difference is that instead of the motorman's position being enclosed by a partition, his space is protected from encroachment by a short railing to which a curtain is drawn down at

and 13¾ in. at the front and 14⅜ in. and 13⅜ in. at the center; the longitudinal ramp in the carbody floor is 2 3-16 in.

The underframe is built up of structural steel shapes and substantially connected to the plate girder side construction; the end framing and roof supports are also of steel. The Brill "Renitent" Post System is employed in the side window construction and the upper sashes are framed in continuous sections; the body end headers are of the arch type, with stanchions at the front and placed to form seat ends and serve as grab handles. Five windows enclose the front end of the car; one at the right of the center window



PETER WITT CARS FOR ERIE. The conductor's position is shown at the left next the center exit. Passengers going to rear of car pay their fare as they pass the conductor; those who remain forward of the conductor's position pay as they leave the car. All leave by the center exit

is stationary because of the destination sign in the upper part; the center window and those to the left are arranged to drop. At the rear end the sashes of the five windows in the circular part are made to raise. A folding step is operated in conjunction with the folding doors at the entrances and a built-in stationary step having wooden treads and steel risers is within the sill line at the center exit.

The side sashes are made with metal stiles and arranged to raise to a height of approximately 21 in., above the window rest. Cherry is used for the interior finish and all panels and moldings are of sanitary type. Single sliding doors are provided at the center exit, and are constructed of 1⅛-in. cherry, glazed in the usual manner in the upper part and with ¼-in. polished wire glass in the lower panels. The front doors are of two-leaf folding type arranged to swing outward and glazed in the same manner as the center doors. Both the cross seats and longitudinal seats are made of sheet steel covered with felt and canvas lined rattan, the seating material being of Brill manufacture and the transverse seats of the Brill sta-

tionary type. The semi-circular seats at the rear are made up in five sections of the same construction as the longitudinal seats.

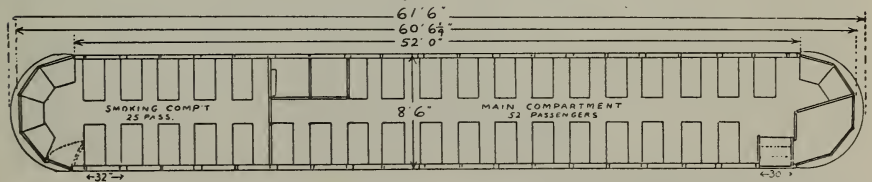
Wire window guards with 2-in. diamond mesh wire and channel iron frames are secured to the bottom rail of each side and rear window sash, with the exception of the sashes behind the door pockets. The guards are enclosed in the pocket formed by the outer steel sheathing and the side finish below the belt rail; by this arrangement the raising of a sash automatically guards the window openings with a screen. The builder's type of push button is installed in each side post 50 in. from the floor and operates a buzzer located over the conductor's position. Push buttons are furnished convenient to the conductor's and motorman's positions; that at the conductor's position operates an electric single-stroke bell placed near motorman.

New Cars for Cleveland, Southwestern & Columbus Railway

INTERURBAN AND SINGLE-TRUCK TYPES

THE Cleveland, Southwestern & Columbus Railway Company operates 225 miles of lines running west of Cleveland to Norwalk and southwest to Bucyrus, with a number of branches from both main lines. The local railways at a number of important points on the routes belong to the same system. The G. C. Kuhlman Car Company has lately furnished six steel cars for interurban service on these lines, and the American Car Company has furnished two single-truck, one-man "Birney" type of cars for city operation.

The larger cars are arranged for single-end operation, and with the exception of the floors, window sashes and doors, are of all-steel construction. The interior is divided into two compartments, a main compartment in the front and a smoking compartment at the rear. At the front right-hand side is a door and triple steps for entrance and exit, and at the rear of the same side is an emergency door, operated electrically from the motorman's position. This door



Height from track to underside of side sills, 3 ft. 6 in.; height from track over trolley boards, 12 ft. 6⅛ in.; height from track to step-tread, 16 in.; risers 11 in. Truck wheel base, 7 ft.; diameter of wheels, 37 in.; bolster centers, 36 ft.



Cars for Cleveland, Southwestern & Columbus Railway. Six of these steel cars for high-speed service on lines running southwest of Cleveland were built by The G. C. Kuhlman Car Company. Mounted on Brill 27-MCB-3-X trucks

has stirrup iron steps. With the exception of the bolster diaphragms, the steel underframe is built entirely of structural shapes. The side sills have a wide horizontal leg which provides a secure attachment for the cross members without requiring the reinforcement of gusset plates. I-beams are employed for the cross members, and the body-end sills are built up in a box form with sides of channel and a top-plate 18 in. in width. Five-inch channels extend from the end sill to the bolster and from the end sill to the bumper, to provide a means of securing the drawbar anchor to properly distribute the drawing and buffing strains. In addition to these center sills the resistance is furnished to offset a heavy impact at the end of the car by means of 12-in. plates which extend from bumper to bolster. At each side sill the platform framing is a continuation of the body end-frame.

Each side of the cars is designed to form a girder to carry the entire load to the bolsters. The top-plate is of angle, the belt-rail is of the builder's standard pressed shape, and the posts are of T-section arranged alternately single and double to provide for the twin windows. The pressed steel letter panel is formed to provide a drip-rail over the stationary upper sashes. The front end is arranged to allow three drop windows in the motorman's cab; the two windows at the left are the same type as those of the body of the car. At the rear end are four windows of the same type as those at the sides. All of the windows, except those at the front end, have stationary upper sashes framed in a continuous piece on each side and glazed with pressed prism glass. The lower sashes raise their full height and attached to the bottom rail of these sashes are wire screen guards which are concealed in pockets in the side walls when the sashes are in their lowered position.

The roof is of the regular plain-arch type, supported on steel carlines and sheathed with ½-in. tongued and grooved poplar

boards, covered with No. 8 duck in one piece, including the hoods. Ten ventilators, five on each side, are placed well down toward the eaves of the roof.

The flooring is double and consists of two layers of 13/16-in. yellow pine, below 13/16-in. maple, both placed longitudinally with a double layer of waterproof tar paper between. The flooring in the aisles is rabbeted out for interlocking rubber tiling; there are no trap doors in the floor. The platform flooring is a continuation of the body flooring and is covered with the same material. Triple steps of the Kuhlman standard type, having sheet steel risers and oak steps fitted with safety treads, are provided with a spring balance trap-door which is operated by a pneumatic device in conjunction with the door, from a handle in the motorman's cab.

The finish of the body end lining and the wainscoting below windows, the partitions and other interior woodwork, is of cherry in natural color and designed to preclude recesses where dust and dirt can accumulate. The window posts are of the "Renitent" type and are of phosphor bronze. The motorman's cab is separated from the main compartment by a partition with sliding door; both door and partition are glazed in the upper part. A low partition is placed just back of the front entrance step. Between the smoking compartment and the main compartment is a partition with swinging door; both the door and the partition are glazed in the upper part. At the left rear corner of the main compartment is a toilet room with standard equipment, and floor covered with a slab of marble. The emergency door at the rear is provided with a torsion spring which opens the door when an electrically operated lock is released by pushing a button in the motorman's cab.



CARS FOR CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY. The cars have window posts of the Brill "Renitent" type. The lower sashes raise their full height; the upper sashes are stationary and framed in continuous sections

In the main compartment are 24 stationary - back seats and one bulkhead seat. The smoking compartment is furnished with 10 stationary - back transverse seats. Those in the main compartment are upholstered with plush, and those in the smoking compartment in hard finished material; all seats are 38 inches over-all, and have



CARS FOR CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY. The American Car Company furnished two Birney "Safety Cars" for city operation, mounted on Brill Light-weight 21-E truck

pressed steel arm-rests and pipe foot-rests. Continuous parcel racks, 14 inches wide, are provided in both compartments.

Brill 27-M.C.B.-3-X trucks carry the cars. The trucks have a wheel-base of 7 feet, and are equipped with 37-in. rolled-steel wheels and axles of the AERA-EC size, with 5 by 9-in. M.C.B. journals.

The Birney "Safety Cars" are of the standard construction and details which apply to these cars having an emergency door at the center of the rear end. The bottom frames are built up of angle side-sills and channel cross-ings. The side-posts are of T-section and continue in one piece from side to side to form the carlines. Side-plates of sheet steel are riveted to the sill angles, belt-rail of flat steel, the T-posts and the angle seat-rests, and to-gether they form the girder side construc-



All unnecessary weight has been eliminated from the construction and equipment of these cars without sacri-fice of strength, convenience or comfort

tion. The corner-posts are of angle, reinforced with oak. Yellow pine is used for the tongued and grooved flooring under the seats; the aisle flooring is of tongued and grooved maple and grooved to form floor strips.

White oak is used for the crown-pieces, head-pieces, vestibule, top-plates, hood rims, rafters, post facings, ribs and vestibule window-rests. The interior finish, including sashes and doors, is cherry. The American Car Company's light-weight stationary-back seats are employed. In front of the emergency door at the rear end is a folding seat for one person. In case of emergency the door is unlocked pneumatically from the same device, connected with the motorman's controller handle, which simultaneously cuts off the current from the motors, starts the sand flowing, applies the brakes and opens the front door and step.



CARS FOR CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY. These cars get their name from the fact that the current is cut off, the sand valve opened, the brakes applied, the front door and step opened and the rear door unlatched by the motorman merely lifting his hand from the controller

The sand box is located on the platform and is of the air operated type arranged to sand both tracks. The box is made of galvanized iron, with a cover arranged to be used for a seat, when desired. A 10-in. foot gong is placed under the platform. An electric push button for signaling the motorman is placed on each side post. Four Brill "Exhaust" ventilators are provided in the roof.

Brill Light-weight 21-E trucks are used under these cars, and have a wheel-base of 7 ft. 6 in. The wheels are 24 in. in diameter, and the journals are of M.C.B. type, 3¾ by 7 in.

New Cars for the Sandwich, Windsor & Amherstburg Railway

BRILL 51-E-1 TRUCKS

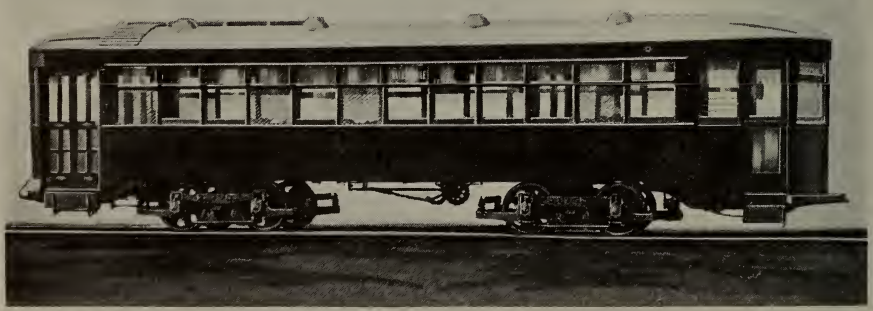
A NUMBER of cars with Kuhlman standard steel-frame bodies, "Renitent" post construction and plain arched roof, and arranged for single-end operation, have lately been placed in service on the lines of the Sandwich, Windsor & Amherstburg Railway Company of Windsor, Canada.

Windsor is a busy little city on the Detroit River, directly opposite Detroit, and is on a transcontinental railroad and several trunk lines, which converge at this point and connect with railways of the United States by means of the recently completed Detroit River Tunnel. The city is the port of entry of Essex County, and is the center of a large coasting trade on the Great Lakes; it is also the center of an important agricultural and fruit-growing district, and has salt works, flour mills, canning factories, type-setting machine and other factories.

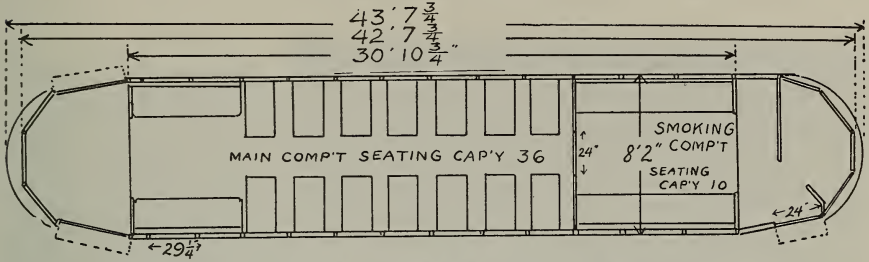
The tracks of the Sandwich, Windsor & Amherstburg Railway extend along the Detroit River for a distance of about 15 miles, serving a populous district with a frequent schedule and modern equipment.

As will be seen by the floor plan, the cars are for single-end operation, and have a smoking compartment at the forward end. The total seating capacity is 46, ten being accommodated by longitudinal seats in the smoking compartment.

The end frame is made up of 5 by 3 by 5/16-in. angle side sills, open box type end sills made of No. 12 United States gage steel, approximately 12 in. in width, having flanges turned on the bottom and riveted to the side sills; the crossings consist of 3-in. I-beams attached to the bottom



The cars are of steel construction, arranged for single-end operation and designed for city and interurban service. Mounted on 51-E-1 trucks



CARS FOR SANDWICH, WINDSOR & AMHERSTBURG RAILWAY. Height from track to under side of side-sills, 2 ft. 9⅜ in.; from under side of sills over roof, 8 ft. 4 13/16 in.; height from rail to step, 13⅛ in.; from step to platform, 12⅞ in.; from rear platform to floor, 12½ in.; ramp of rear platform floor, ¾ in. Wheel-base of trucks, 4 ft. 6 in.; wheel diameter, 33 in.; bolster centers, 18 ft. 8¾ in.

flange of the side sills; the bolsters are of the built-up open-truss form. The platform framing consists of 7 by 3½ by ½-in. angle outside knees and drawbar sills of 5 by 4 by ½-in. angle; the latter extend from the face of the bumper to the end sill.

The entire side of the cars, together with the side sill angle, forms a girder which transmits the entire load to bolsters. An angle top-plate of 3 by 3 by ¼ in. and a plate-rail of pressed shape are secured to 2 by 1½-in. posts. Side plates of 3/32-in. steel are applied in three sections to a side. The letter-panel plate is of ⅛-in. pressed steel.

The roof is of the plain arch type and of the form known as the Kuhlman "true radius" pattern. The roof frame consists of angle top-plates with the horizontal leg turned in, steel carlines with a foot forged at each end for riveting to the vertical leg of the top-plate.

Open bulkheads forming an arch at each end of the car have pipe stanchions and railings which serve as grab handles. These bulkheads, and other parts covered with wood, are finished in quarter-sawed white oak. The headlinings are of composition material and the side and end wainscoting is of sheet steel. A partition of quarter-sawed white oak separates the smoking compartment from the main compartment and is fitted with a swinging door. Both sides of the partition and the door are glazed in the upper parts. A smaller partition, with door placed diagonally, forms the motorman's cab on the front platform.

The window posts are of the Brill "Renitent" type with spring brass casings. All the side window sashes, with the exception of one at the center which is fitted with a destination sign, are arranged to raise their full height and have wire screen guards attached to the bottom rail of the sashes, which guards are concealed in pockets in the side walls when the sashes are in the lowered position. The upper sashes are stationary and are framed in a continuous piece. Brill stationary-back seats upholstered with canvas-lined woven rattan, are employed in the main compartment, and longitudinal seats of the same manufacture are used in the smok-



Cars for Sandwich, Windsor & Amherstburg Railway. The window posts are of the Brill "Renitent" type. The lower sashes raise their full height; the upper sashes are stationary and framed continously. Brill stationary-back seats in main compartment

ing compartment and at the rear of the main compartment.

At the front end the door of the sliding type, operates in unison with the folding step, and is controlled by manually operated devices from the motorman's position. The rear doors are of the double two-leaf folding type, hinged to fold at each side of the door opening, and operated by a pneumatic device from any point in the car, or from either platform.

The cars are mounted on Brill 51-E1 trucks with wheel base of 4 ft. 6 in. and 33-in. wheels. These trucks have Brill solid forged side frames.

New Cars for East St. Louis and Suburban Railway

CITY AND INTERURBAN TYPES

THE East St. Louis & Suburban Railway Company during the last few months has put in operation on its city lines 45 motor cars with 26 ft. 4 in. bodies and 5 with 31 ft. 8 in. bodies, and on its interurban line to Granite City and Alton, 3 center-entrance motor cars and one center-entrance trailer, all built by the American Car Company.

East St. Louis, Illinois, is a city of 85,000 population, and is on the Mississippi River, opposite St. Louis. It is distinctly a manufacturing city and has important advantages in this connection, because of its 23 railways and its proximity to large coal fields and rich agricultural lands. The network of electric lines which covers East St. Louis and its suburbs, converges at the Eads Bridge, and many of the cars cross to the St. Louis side. In addition to the city lines, the East St. Louis & Suburban Railway Company operates an interurban system consisting of a line to Alton, 26 miles up the river; a line running about 15 miles southeast to Belleville; one about 20 miles directly east to Lebanon; and a loop formed of lines branching from the northern and southern divisions that meet at Edwardsville, about 20 miles

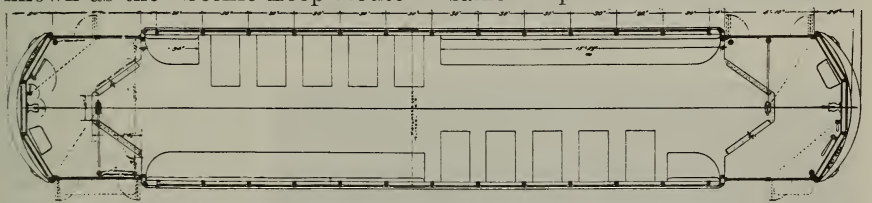


CARS FOR EAST ST. LOUIS & SUBURBAN RAILWAY. Fifty of these cars were furnished for city service, five have twelve windows to a side and forty-five have ten windows. All are mounted on Brill 39-E trucks

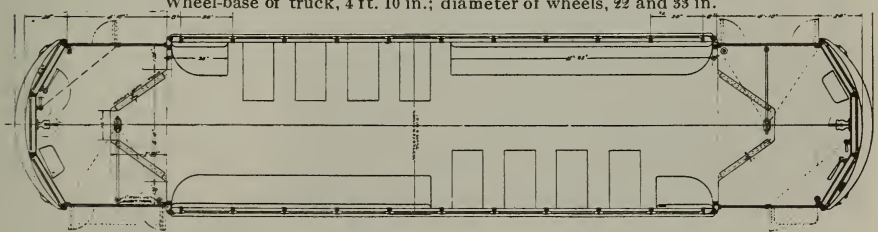
northeast of East St. Louis.

The Alton Division is the banner line of the "East Side System" and is equipped with vestibuled limited trains which make the run between St. Louis and Alton in less than an hour. The line to Belleville is double-tracked and the cars are operated at ten-minute intervals during rush-hour periods. The loop around Edwardsville is known as the "Scenic Loop Route" and furnishes a popular 50-mile run through an interesting and beautiful section of the state. The larger and smaller cities of the section which are served by the lines are all thriving industrially and commercially.

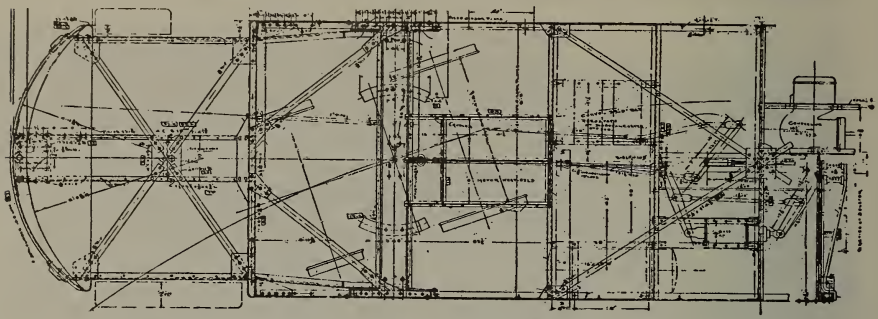
With the exception of being two windows shorter and having slight changes in the underframe, the 45 cars with 26 ft. 4 in. bodies are the same in plan and detail as the 5



Five of these cars were furnished. Length of body over corner posts, 31 ft. 8 in.; length over platform, 45 ft. 4 in.; length of platforms, 7 ft. 4 in.; centers of side posts, 30 in.; width over sides, 8 ft. 6 in.; extreme width, 8 ft. 8 in.; width of aisle, 43 in.; height from track to underside of side-sills, 32 11/16 in.; from underside of side sills over trolley boards, 8 ft. 6½ in.; from floor center of carlines, 7 ft. 8 in.; from track to step, 13⅞ in.; step to platform, 13 in.; platform to floor, 9 in. Wheel-base of truck, 4 ft. 10 in.; diameter of wheels, 22 and 33 in.



Forty-five of the cars of this size were furnished. Length of body over corner-posts, 28 ft. 4 in.; length over platforms 41 ft. Other dimensions are the same as given with the above floor plan



CARS FOR EAST ST. LOUIS & SUBURBAN RAILWAY. The diagram shows the under-frame plan of the 12-window cars, that of the 10-window cars is generally similar. They are built of angle side-sills, channel crossings and end sills. The sides are of the plate girder type

cars with 31 ft. 8 in. bodies. The underframes are of all-steel construction built up of standard rolled-steel shapes. The side sills are composed of 2½ by 2½ by ¼ in. angles substantially reinforced at the bolsters, and in addition to the bolsters are connected by 9-in. channels and sills, and 4-in. channel crossings. In the shorter cars the diagonals extend from the center of the frame to the bolster, and in the longer cars, from the center of the cars to the first crossing inside the bolster; in the latter cars diagonals are also used from the bolster to the points where the drawbar sills join the end sill. Gusset plates of 5/16-in. thickness connect end and side sills.

The outside platform knees are composed of 8-in. channels reinforced by 6½ in. by ⅜ in. by 4 ft. 6 in. angles under the end sills and tied across by diagonals from gusset plates in the four corners of the platform and to the drawbar plate in the center.



The plan of having tranverse seats opposite longitudinal seats to obtain greater aisle room has long been successfully used in the cars of this company.

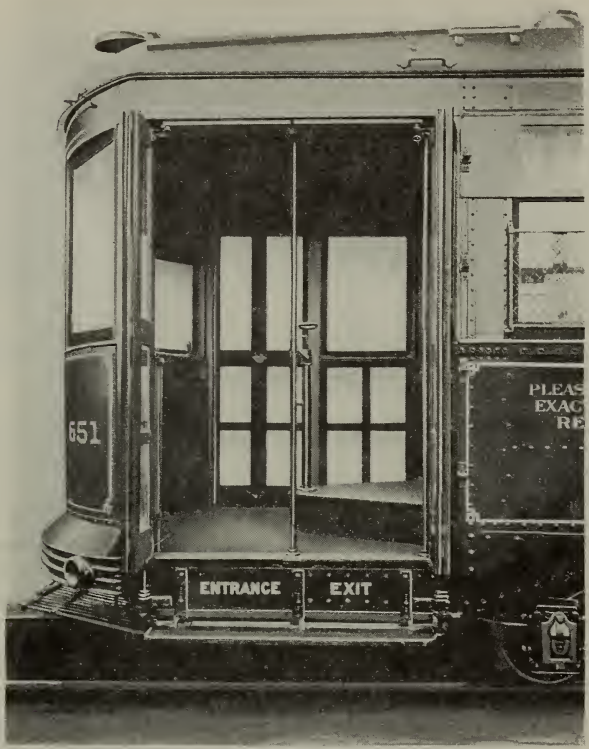
The side construction is the builder's standard type of plate girder, employing No. 12 sheet steel in three sections to a side, the sections being secured together with 4 by ⅛ in. splice plates; T-posts of 1½ by 1½ by ¼ in. at the car corners and spaced 30 in. from center to center, extend from the sill to the angle top-plate. The top-plate is riveted to a 9¾ in.

wide plate of No. 16 sheet steel, which forms the letter panel; the lower edge of the panel is pressed out to form a capping for the upper window sashes and to deflect water. Steel rafters 1½ by 5/16 in., with the foot bolted to the top rail over the top of each side post, support the plain arch roof.

The bolsters are of the built-up open truss form and have the upper plate bent down and brought under the side sill reinforcing angles; this upper plate is 9 by ¾ in., and the lower plate 9 by 1 in.

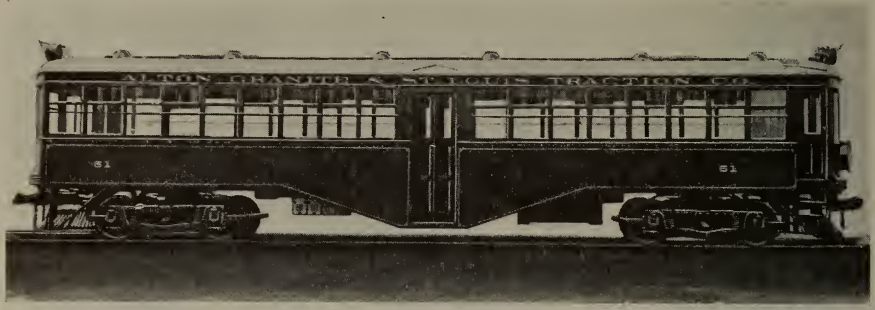
Tongued and grooved maple above tongued and grooved yellow pine, both laid longitudinally with paper between, constitute the flooring; no floor mats are provided. At each end of the car the floor is ramped from the end sill to the bolster, reducing the height at the end sill 3 in.

Below the belt rail the interior lining is of composition material secured to wood furring which is bolted to the side posts; this material is painted a mahogany color to correspond with the mahoganized finish of the woodwork throughout. The lower side sashes are arranged to raise their full height; the upper side sashes are framed in a continuous piece from corner post to corner post. In the vestibules the sashes are single and arranged to drop into pockets. All sashes are made of cherry, stained mahogany color. The accompanying floor plans show the door arrangement and seating plan of these cars.



CARS FOR EAST ST. LOUIS & SUBURBAN RAILWAY. All doors fold outwardly and are manually operated. The doors at the entrance-exit openings are operated from the conductor's position, and the motorman controls the exit door at his right

The three center-entrance motor cars and one center-entrance trailer referred to in the first paragraph of this article, are for operation on the lines of the Alton, Granite & St. Louis Traction



CARS FOR EAST ST. LOUIS & SUBURBAN RAILWAY. Four of these steel center-entrance cars were furnished for operation on the Alton division; three of the cars are equipped with motors and one is arranged for trailer operation. All four cars are mounted on Brill 27-MCB-3-X trucks

Company, which are a part of the East St. Louis & Suburban System. The cars are identical except in the matter of operating equipment. The longitudinal members of the underframe consist of 4 by 3 by 5-16 in. wide sills brought down at the center to come under the doors. The center sills are built up in an I-beam form, having the web plate 8 in. deep from the end of the car to a point 4 ft. 3 in. back from the center of the bolster, increasing in width from that point toward the center of the car, a distance of 7 ft. 4 in., where the depth of the plate is 15 in. Channel crossings of 4 in. depth are connected with the center and side sills by corner brackets. Open truss form built-up bolsters have 9 by 1 in. top plate and 9 by 1¼ in. bottom plate. Diagonals connected to the side sills by gusset plates brace the frame at both sides of the bolsters to a distance about equal to the width of the frame; long diagonals reach from a plate attached to the center sills at the center of the frame to the gusset plates on the side sills to which the short diagonals are attached.



These cars were furnished with individual chairs, like club cars, see floor plan on opposite page.

The side construction includes 3-32 in. plates, reinforced at the side doors with 10 by ⅛ in. plates at each side, having 2 by

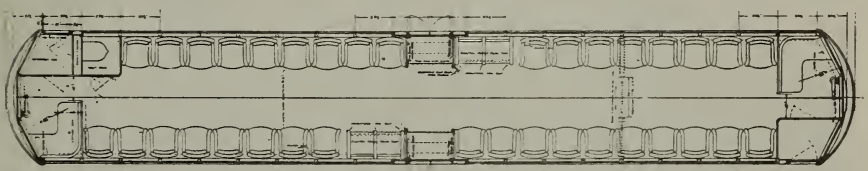
2 by ¼ in. angles at each side of the plates; a wide plate, together with angles, reinforces the construction over the doors.

The upper parts of the cars are constructed similar to the city types, and have the same interior finish, except that the roof has headlining instead of a rafter finish. The center doors are of the single swing type, made of 1⅛-in. mahogany and glazed in the upper panels; they extend to the bottom step, open upwardly, and are operated by a simple mechanism from the interior of the car so arranged that it is impossible to open the side doors with the trap-door in closed position. The motorman's side door is of mahogany, glazed in the upper panel, and fitted with a drop sash and arm rest.



CARS FOR EAST ST. LOUIS & SUBURBAN RAILWAY. The center doors open outwardly and when closed are locked in place by the trap over the triple steps

Circular leather upholstered seats are installed at each end of the car and individual seats are placed along the sides. A rack for storing folding chairs is provided above the bulkhead at one end of the car. The interurban cars are mounted on Brill 27-M.C.B.-2-X trucks.



Length over end sheathing; 52 ft. 8 in.; length over bumpers, 53 ft. 8 in.; width of center door opening, 34 in.; width over sides, 8 ft. 6 in.; from truck to underside of side sills at bolsters, 3 ft. 4¾ in.; from underside of sills to top of roof, 8 ft. 6 in.; from track to side-sill at center, 11½ in.; from track to tread of lowest step, 15¾ in.; risers, 11 in.; from track to top of car floor, 4 ft. 0¾ in. Wheel-base of trucks, 6 ft. 6 in.; diameter of wheels, 34 in.; bolster centers, 34 ft. 2 in.

Short Double-Truck Cars for Montgomery Transit Company, Penna.

BRILL 77-E TRUCKS

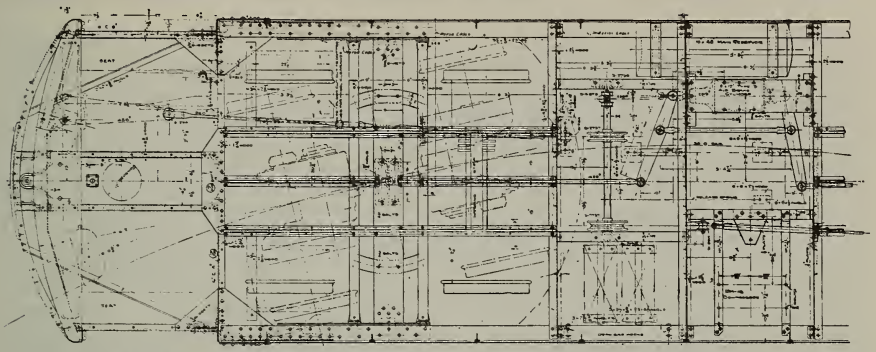
THE Montgomery Transit Company operates a 13-mile line from Norristown—a manufacturing town on the Schuylkill River a short distance north of Philadelphia—to Harleysville, and is constructing a 4½-mile line from Harleysville to Souderton and a 12-mile line from Lederach, near Harleysville, north to East Greenville. The system serves the northern half of Montgomery County which adjoins Philadelphia County, and is a thickly populated farming section largely devoted to dairying. Running out of Norristown the cars of the system are operated over the tracks of the Reading Transit Company three miles to the town of Trooper, where they turn north on the Montgomery Transit lines.

In the morning the tide of traffic is toward Norristown, and in the evening is in the opposite direction. Except on the lines between Norristown and Trooper, the cars are operated by one man, the conductor leaving a north-bound car and boarding a south-bound at Trooper. When operated as a one-man car the rear doors are, of course, locked, and the entrance-exit is then at the front. Short as the carbodies are, they have a smoking compartment, which has much to do with the popularity of the cars. It will be noticed in the framing plan that the platforms are extra wide; this is to provide space for carrying mail matter and packages.

The company operates a freight service, handling garden and dairy produce going south and general freight and store supplies going north. A freight interchange is maintained with the Philadelphia



The cars are constructed with straight girder sides, steel bottom and upper frames and flush platforms. Mounted on Brill 77-E trucks, equipped with 26 in. diameter wheels



CARS FOR MONTGOMERY TRANSIT COMPANY. Length over corner posts, 23 ft. 10 in.; length of platform, 33 ft. 3 in.; length of smoking compartment, 6 ft. 7 in.; centers of side posts, 2 ft, 8 in.: width over posts at belt, 8 ft. 2 in.; extreme width, 8 ft. 5½ in.; height from track to under side of side sills, 2 ft 2⅛ in.; from under side of side sills over trolley boards, 8 ft. 8⅞ in.; floor to center of headlining, 7 ft. 8 in.; track to step, 15 in.; step to platform, 14½ in.; ramp in car floor, 1½ in.; wheel base of trucks, 5 ft. 0 in.; diameter of wheels, 26 in.; weight of electrical equipment, approximately 1250 lb.; air brake equipment, approximately 1200 lb.; trucks, less gears and pivot plates, 10,320 lb.; motors, 3600 lb.

Rapid Transit Company which enables the freight cars to be routed through to the central freight station on Market Street.

A few weeks ago the Montgomery Transit Company put in operation three new cars of the type illustrated, built by The J. G. Brill Company and designed to suit the special requirements of the service of this interesting system. The cars are built on a light steel underframe made up of 5 by 3½ by 5-16 in. side sills, with 6-in. channel end sills reinforced at the juncture of the side sills with wide 5/16-in. gusset plates. The angle crossings are riveted to the wider leg of the sill, which is placed horizontally for the purpose, and avoids the use of gusset reinforcements. As the frame is short, there are no diagonals, the cornerwise strains being amply resisted by the corner gusset plates. Built-up bolsters of open truss form have 9 by ⅝ in. top plates and 9 by ⅞ in. bottom plates. Six-inch journals are employed for the side sills of the platforms, and the diagonals, which will be seen by reference to the framing plan, are of 2 by 2 by ⅜ in. angle, placed so as to distribute part of the hauling and buffing shocks and strains directly to the side sill and thus relieve the central part of the end sill from bearing most of the stresses.

Plate girder side construction is of the usual Brill type, consisting of plates riveted at the bottom to the side sill, reinforced at the top with a flat bar and at the centers with light angles; the latter are utilized as seat rests. The pressed steel window sill capping is riveted together with and over the belt rail. The plates are applied in three sections to each side; the two end plates extend over three window spaces and the central plate extends over two windows; they are stagger-riveted to the posts and double-riveted at the splice plates. The side posts are of T-section and

extend from the side sill to the top rail and are riveted to both with 5/16-in. rivets. The letter boards are of wood secured to the flanges of the T-posts from the inside. Pressed steel carlines of U-shape separate the roof; the roof boards are attached to wood fillers in the carlines. The platforms are of the same width over the vestibule posts as over the carbody side posts; the three vestibule windows are fitted with single drop sashes with racks for the center window to enable the sash to be held at any desired height.



Cars for Montgomery Transit Company. The cars are only 33 ft. 3 in. long over the vestibules, but have two compartments and seat 36 persons

From the end sill to the center of the bolster at each end of the car, the floor is ramped 1½ inches, which brings the flush platform to 29½ inches from the rail head without live load. On each side of the platform is a folding step of ash fitted with a safety-tread and arranged to raise and lower in conjunction with the vestibule folding doors. The doors fold against the end of the carbody; they are operated on each side by two shafts on the platform, one for each side. The upper part of the doors is glazed with clear glass and the lower part with clear wire glass.

Double-sash side windows have the top sashes stationary and in a frame extending the full length of the body; the lower sashes raise their full height. Four-rod window guards at the sides are hinged to drop. Cherry, stained mahogany color, is used for the interior finish; the ceiling and wainscoting below the side windows are of composition material.

The smoking compartment accommodates eight passengers and is separated from the main compartment by a cherry partition with a single swinging door at the center. The main compartment is equipped with Brill "Winner" seats, four on each side, with a stationary-back seat next to the partition; longitudinal corner seats next the bulkhead accommodate two passengers each. Longitudinal seats are installed in the smoking compartment.

The cars are borne on Brill trucks of the 77-E type, equipped with 26-in. wheels. These trucks have the Brill "Graduated Spring System."



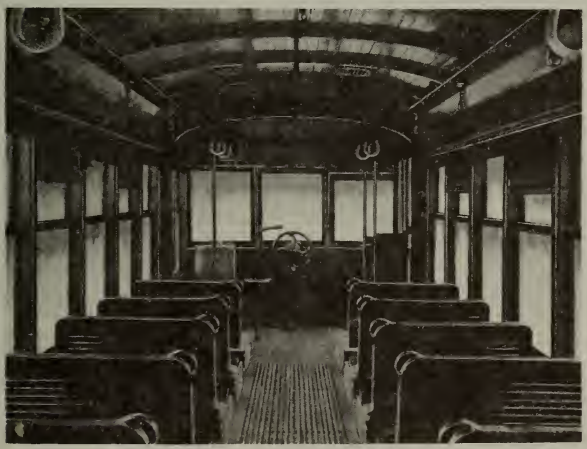
These cars are of steel construction and equipped for double-end operation. Doors at diagonally opposite corners. Mounted on Brill Radiax E-1 truck

Single-Truck Double-End Type for Boulder, Colorado

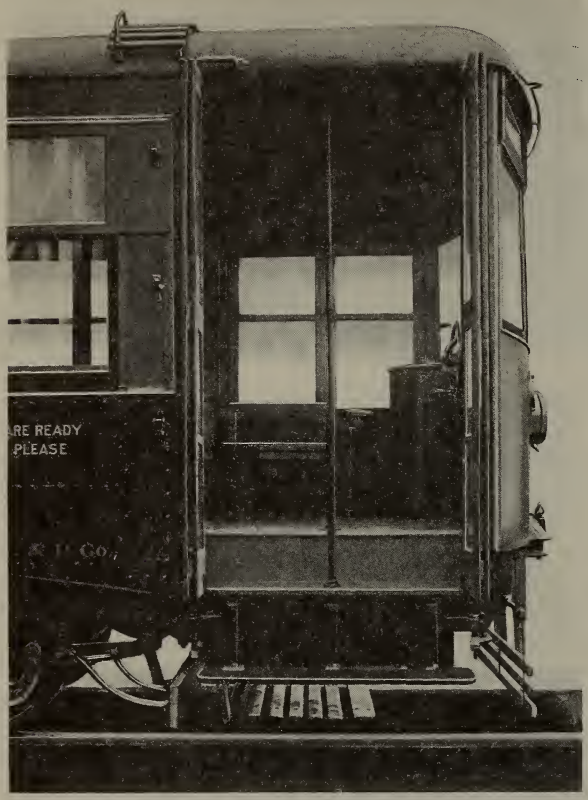
BRILL "RADIAX" E-1 TRUCK

THE Western Light & Power Company recently put on its lines at Boulder, Colorado, the type of car for one-man operation shown in the accompanying illustrations, built by the American Car Company. In general the cars are of the double-end type, with the entrance-exit at the diagonally opposite corners, all-steel frame, flush platforms and transverse seating arrangement.

Boulder is a small city thirty miles northwest of Denver, in a valley flanked by high mountains. It is on the Union Pacific Railway, and is at the junction of two other trunk lines. The surrounding country is irrigated and successfully combines mining and agriculture. Oil and natural gas are plentiful in the vicinity, and there are extensive oil refineries in the city. The State University is located here, and the Colorado Chau-



Five transverse seats of Brill "Winner" type, and two longitudinal seats on each side of aisle. Folding seat at door of each platform and stationary seat opposite



CARS FOR BOULDER, COLORADO. The cars have flush platforms and double steps at the opening, the lower step folding in conjunction with the doors

tauqua, which is an annual summer school, holds its sessions at Chautauqua Park, on an eminence 400 feet above the city and just outside the southern limits. Boulder is 5,300 feet above sea level and is noted for its healthful climate.

The side sills are of 2½ by 2½ by 5-16 in. angle, extending the full length of car body in a continuous piece. The cross sills are of 4-in. channel section secured to the side and truck sills with ⅛-in. gusset plates. The cross sills at the corner posts are reinforced to carry the platform sills. The platform sills are of 6-in. channel set in 5 in. from the side of the car, and secured to the side sills, crossings and dasher angles.

The side and top construction is formed of 1½ by 1½ by 3-16 in. T-posts, continuing in a single piece from side sill to side sill; corner posts 1¼ by 1¼ by ⅛ in. angle also extending in a continuous piece from side to side; a dropper bar of 2 by ¼ in. steel extends the full length of the car-body and around the corner posts.

The general dimensions of the cars are as follows: Length over corner posts, 18 ft. 3½ in.; length over end sheathing, 29 ft. 1 in.; length of platforms, 5 ft. 4¾ in.; centers of side posts, 28½ in.; width over sides, 7 ft. 10 in.; extreme width. 8 ft. 1 in.; height from track to under side of side sills, 32⅛ in.; height from under side of sills over trolley boards, 8 ft. 5½ in.; track to step, 15½ in.; risers, 13½ in. and 9 in. Wheel-base of truck. 11 ft.; wheel diameter, 33 in. Track gage, 4 ft. 8½ in.

Interurban Combination Type Car for Hagerstown and Frederick Railway

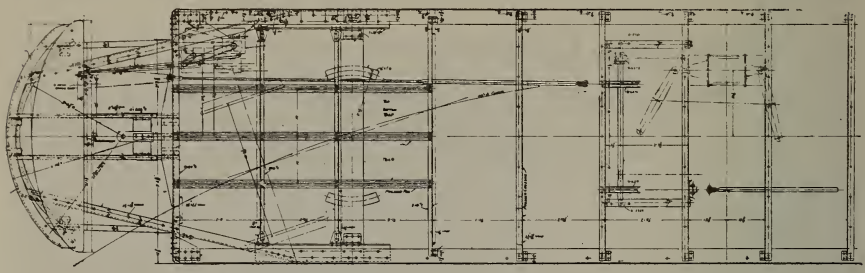
BRILL SEMI-CONVERTIBLE WINDOW SYSTEM

THE Hagerstown & Frederick Railway Company, which operates "The Heart of Maryland Route," has lately received an interesting type of combination passenger and baggage car from The J. G. Brill Company for service on its main line between Hagerstown, in northern Maryland, and Frederick, about thirty miles to the southeast. The main line crosses the Blue Ridge Mountains, traversing for most of its distance populous and fertile valleys. Branches extend from Frederick to Thurmont, 20 miles to the north, and from Hagerstown there are branches north and west, one connecting with the Chambersburg, Greencastle & Waynesboro line in southern Pennsylvania. Five-mile branches also extend from Boonesboro Junction to Boonesboro and Braddock Heights, where the company owns a popular park, and to Jefferson. It is planned to extend the line from Jefferson to Brunswick, on the Potomac River.

In general the new type of car consists of a 37-ft. body, having ten windows in the passenger compartment, sliding doors in the baggage compartment, and vestibuled drop platforms at each end. The bottom frames are chiefly made up of 6 by 3½ by 5-16 in. angle side sills riveted to the bottom of the side plates. The end sills are of steel channel section pressed into Z shape, and the crossings of angle riveted to the wide leg of the sills, each placed horizontally for the purpose; 7 by 3½ by ½ in. angles with wooden fillers form the outer platform



Steel underframe and plate girder sides with wooden posts forms the framing of this combination type of interurban car



CARS FOR HAGERSTOWN & FREDERICK RAILWAY. Length of body over corner posts, 37 ft.; length over vestibule, 41 ft. 8½ in.; length over bumpers, 42 ft 6½ in.; length of platforms, 4 ft. 8½ in.; centers of side posts, 2 ft. 8 in.; width over sides, 8 ft. 6 in.; height from track to underside of side sills, 3 ft. 5¼ in.; from track to platform step tread, 16 in.; risers, 11 in ; from platform to car floor ⅛ in. Wheel-base of trucks, 6 ft. 2 in.: diameter of wheels, 34 in.; bolster centers, 25 ft.

knees, and, together with the channel drawbar sills, capped by a 7 by 3½ by ½ in. angle steel bumper.

The side construction is of the Brill standard plate girder type, made up of 3/32-in. plates riveted to the side sill, and a 2 by 1½ by ¼ in. angle at the top with inward-extending web. At the baggage compartment door opening, which interrupts the side construction close to the car end, a ⅜-in. Z-plate with 9-in. vertical web reinforced at bottom with a 2½ by 2½ by ⅜ in. angle, extends 8 ft. back from the end sill, which brings it 2 ft. inside the body bolster and furnishes a strong construction at this part. The side posts are of 2 15-16 in. thick straight-grained ash, and corner posts 3⅝ in., of the same. Steel carlines reinforce the wooden carlines of the plain arch roof, and the post and roof construction are arranged for the Brill tandem type of semi-convertible window sashes. Both the inside and outside of the round-end vestibules are sheathed with sheet steel, and the three windows have a single sash which drops into pockets; the center sash is provided with racks to hold it at various heights.



The windows are of the Brill semi-convertible type, with sashes joined by full width brass hinge. Each pair of sashes has its pocket between the roof and the headlining

Cherry in natural finish is employed for the interior finish, including the doors, linings and moldings. The passenger com-

partment is furnished with Brill "Winner" seats and longitudinal corner seats next the platform, seating forty passengers in all. One of the longitudinal seats at the platform end of the compartment is arranged to be removable and its place occupied by a heater during the winter. Brill "Exhaust" ventilators, eight for the main compartment and two for the baggage compartment, are placed along the center of the roof. Mutually operating double sliding doors at the passenger end of the car, and a single sliding door at the baggage end in the partition between the compartments, are glazed in the upper part. The platforms have stationary double steps at each side and are provided with the builder's automatic folding door device.

The passenger compartment is 27 ft. 10 in. long, and the baggage compartment 9 ft. 2 in. The interior of the baggage compartment is painted a lead color. Folding seats of cherry slats are hinged to the side walls.

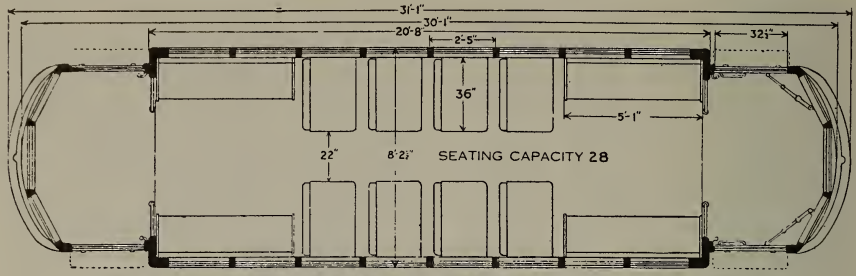
Single-Truck Cars for Brattleboro, Vermont

BRILL 21-E TRUCK

THE Twin State Gas & Electric Company, which operates the lines in Brattleboro, Vermont. and its vicinity, has recently put in operation several new cars built by the Wason Manufacturing Company. The cars are for one-man operation, although they are not equipped with platform railings and special one-man devices



Although these cars have no special feature for one-man operation other than door operating mechanism, they are being operated as one-man cars



CARS FOR BRATTLEBORO. Height from track to under side of sub-sills, 2 ft. 2⅝ in.; from track over trolley boards, 11 ft. 7⅝ in. Total weight, 21,800 lb

other than conveniently placed handles for operating the doors.

In the underframe, 3 by 2 by ⅜ in. angle side sills are connected by 6 by 4 by 10 by 3-16 in. Z-shaped end sills, 3½ by 2½ by 5-16 in. angle crossings, and are braced diagonally by 2 by ⅜ in. bars. Subsills of 6-in., 10.5-lb. channel extend the length of the body, spaced about 1 ft. from the side sills. The platforms are supported by 6 by 3½ in. poplar boards and are covered with steel sheathing. The upper sashes of the body windows are stationary, and the lower sashes raise. The vestibule center sash is arranged to raise to any desired height, the other two being stationary.

Interurban Centers and Interurban Cars

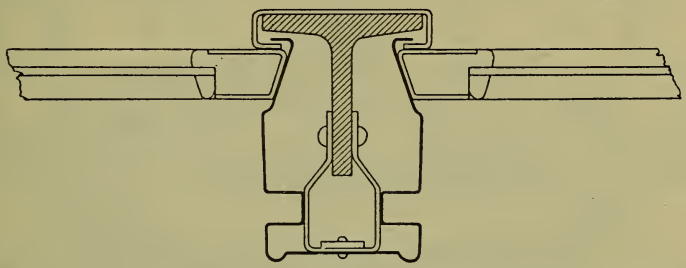
SPRINGFIELD, MASS.

(*Continued from page 215*)

in the bulkheads. As passengers enter and leave the cars from the pavements of city streets or from the roadway along the route, the platforms are of the double type and have single steps like the city cars. The seating plan consists of transverse seats with corner seats accommodating two persons each, the total seating capacity being 48. Length over carbody, 35 ft.; length over bumpers, 46 ft. 4½ in.; weight of carbody, less electrical equipment, 21,150 lb. For further details of this car, see BRILL MAGAZINE, Vol. 8, page 115.

As the city cars of the Springfield lines run far out in the suburbs and to cities and towns at some distance from the center, the type employed is designed to adapt itself to both suburban and city service. These cars are of steel construction and have convertible sides; the side panels and sashes are removable and when removed the openings are protected by pipe guards. They seat 48 passengers and the body, less electrical equipment, weighs 19,000 lb. A description of these cars appeared in BRILL MAGAZINE, Vol. 9, page 91.

Interchangeable Window Sashes



THE spring-brass casing of the Renitent Post provides snug-fitting, moisture- and rattle-proof runways for the window sashes. Besides giving a perfect fit to the sashes the Renitent Post System makes all side sashes interchangeable and has the added advantage of enabling sashes to be installed and removed instantly and without the use of tools.

RE-NI-TENT—"Offering elastic resistance to pressure"—(*Dictionary*)

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London Office

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AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS

Cable Address: "Bogibril," Paris

Agencies

AUSTRALASIA—Noyes Brothers, Melbourne, Sidney, Dunedin, Brisbane, Perth

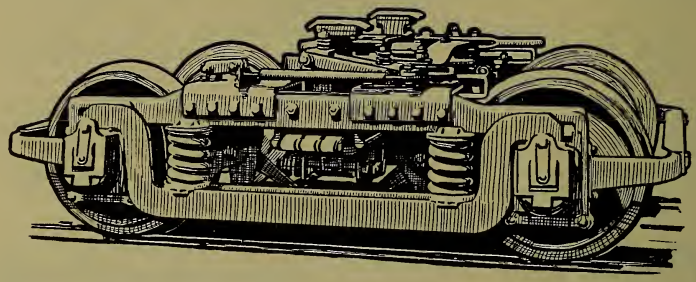
ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158, Buenos Aires

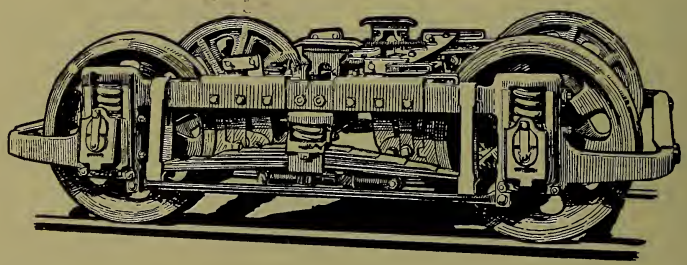
NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

UNRESTRICTED SPRING ACTION



THE 27-MCB Truck has three distinctive features (patented) that are immensely important to smooth riding—the Graduated Spring System for light and heavy loads, the Bolster Guide which makes the bolster "float" on its springs at all times, and the Side-swing Dampener which prevents swaying and "snaking" of the carbody.

FOR LIGHT AND FAST CARS



THE 77-E Truck has inside-hung motors and therefore is in the light interurban class. Small-diameter wheels are used in many cases as it is well adapted to low-platform cars and is employed under many of the modern center-entrance types.

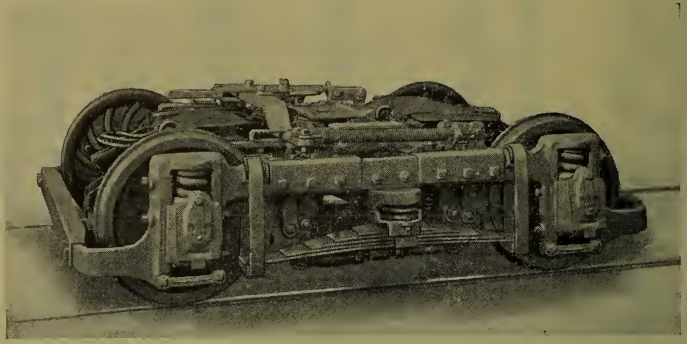
VOL. 11 FEBRUARY, 1918 NO. 9

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BRILL MAGAZINE

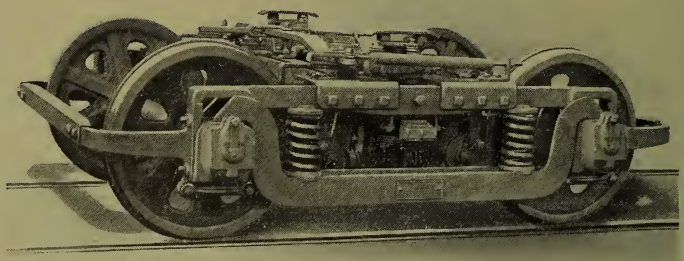


SMITHSONIAN
FEB 11 1977
LIBRARIES



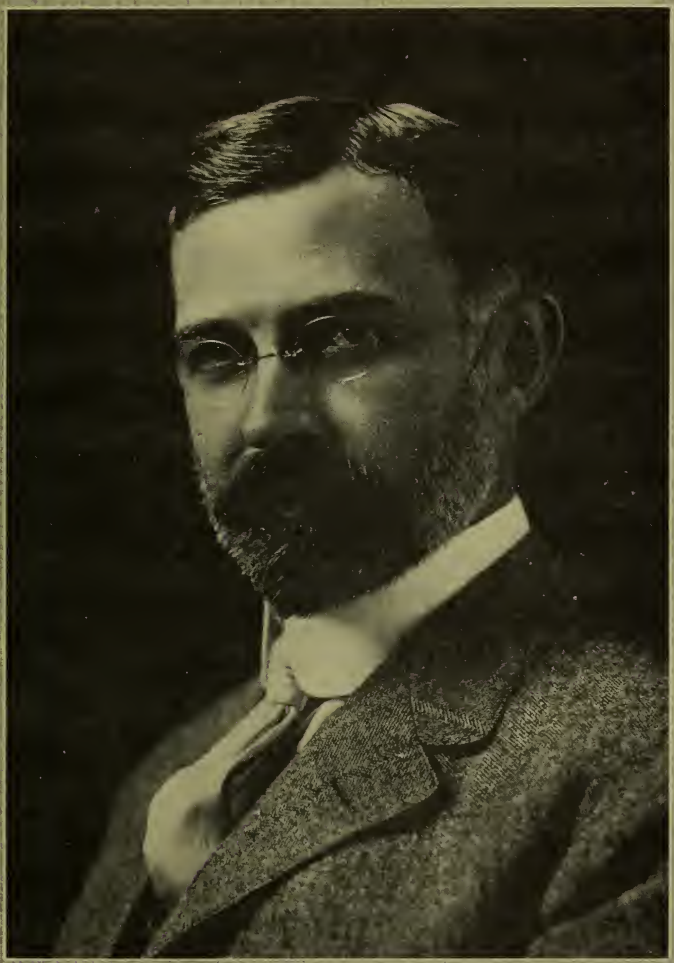
For Light Interurban Service

HAVING inside-hung motors, the 77-E Truck is the correct type for faster service than suited to double-motor trucks of the inside-hung type, service that is not fast enough for regular interurban trucks. Equipped with small-diameter wheels, it is well adapted to low-platform cars



Brill Standard Interurban Truck

THE 27-MCB Truck is built in seven standard sizes with load capacity per pair of from 46,000 to 120,000 lb. The Brill Graduated Spring System, Bolster Guide and Side-swing Dampener enable these trucks to impart to the carbody a singularly smooth and easy motion



Henry L. Doherty

President, Cities Service Company

BRILL MAGAZINE

VOL. 11—NO. 9
Copyright, 1918, by The J. G. Brill Company, Philadelphia, U. S. A.
FEBRUARY, 1918

HENRY L. DOHERTY

HENRY LATHAM DOHERTY, President of the Cities Service Company, was born in Columbus, Ohio, on May 15, 1870. At twelve years of age he left school to become an office-boy for the Columbus Gas Company. He advanced rapidly in Columbus and remained there for eight years, until 1890, when he became associated with various utility companies as Chief Engineer and General Manager. It was during this period that he studied the technical side of the gas industry and thus fitted himself for engineering and executive positions. His first experience as an executive was in Madison, Wis., and he later was in charge of public utility companies in St. Paul, San Antonio and Denver. It was his work in Denver which eventually led to the formation in 1905 of the firm of Henry L. Doherty & Company, operators of the Cities Service Company. Meanwhile he had been associated with about twenty-five other public utility companies in various parts of the United States and became an acknowledged authority in the gas and electric business. He had patented various combustion processes which advanced the gas industry and originated many practices which have since become standards. In recognition of his services to the industry, in 1898 he was awarded a gold medal by the American Gas Light Association. Since that time he has been elected an honorary member or official of all the important engineering societies, and in addition is President of the Society for Electrical Development. At present his name is chiefly associated with the Cities Service Company, which controls electric, gas, natural-gas, water-power, traction and oil properties in 26 states of the Union, and is operating in more than 100 communities. The company is a $150,000,000 corporation, and employs more than 14,000 people in its various subsidiary companies.

Interurban Centers and Interurban Cars

SCHENECTADY, NEW YORK



SCHENECTADY, the Gateway to the Mohawk Valley, which is unexcelled in scenic effect and beauty by any territory in the east, situated on the Mohawk River, having a population (1916) of over 98,000, is one of the marvels of growth and industrial developments of modern times. Located here are the parent plants of the General Electric Company and the American Locomotive Company, employing respectively 22,000 and 6,000 people, which makes the slogan "Schenectady Lights and Hauls the World" quite appropriate.

Other manufacturing industries of the city include hosiery, knit goods, mica insulators, gasoline fire engines, agricultural machinery and implements, varnishes, wagons and carriages. It is the seat of Union College, which comprises the academic and engineering departments of Union University, and is one of the oldest institutions of learning in the country. Its banks and trust companies, department stores, markets and great variety of shops and mercantile establishments make it the commercial and shopping center of a considerable territory. The Schenectady County Court, the churches, hospitals, armories, libraries, clubs and other civic, religious and social institutions contribute to its progressive life and activities.

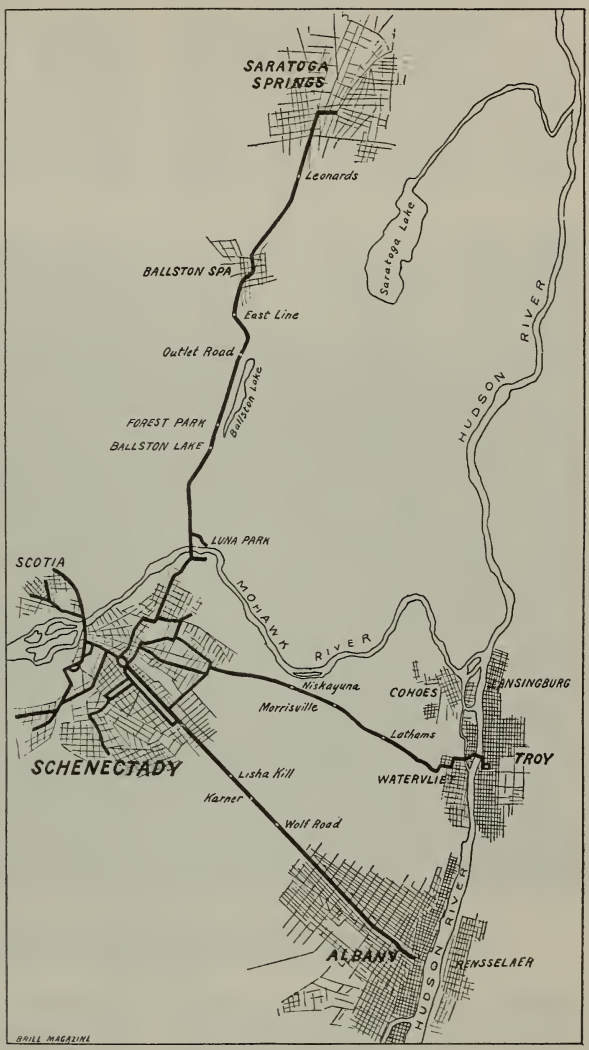
The Schenectady city division of the Schenectady Railway Company consists of ten city and suburban lines and three interurban division lines that pass through or run to and from the city terminal, handling approximately 25,000,000 passengers annually.



Waiting Station of the Schenectady Railway is at the center of the city and serves all the interurban divisions

The Albany Division extending between Schenectady and Albany, 15½ miles in length, having forty station stops, is operated

with limited and local train service. Albany, the terminal of this division, is the capital of New York State, having a population of 108,000, and is noted as an important railroad center and navigation terminal, being the terminal of the larger Hudson River day and night boats operating between Albany and New York and ranking the largest river steamers in the world. The Albany terminal of these boats and the cars of this company, which are operated in direct connection, is practically one. The advantages are correspondingly obvious to each. The running time (limited between terminals) is 45 minutes, local car 55 minutes. The tracks of this division are without a curve between Schenectady and Albany.



Interurban Centers and Cars. The system of the Schenectady Railway Company comprises three interurban divisions and ten city lines. Approximately 25,000,000 passengers are carried annually

The Troy Division extending between Schenectady and Troy, a distance of about 17 miles, over a more or less irregular route, finds its terminal in the center of railroad and navigation activities in Troy, a city of 75,000 people, augmented by the cities of Watervliet and Green Island with populations of 15,000 and 4,500 respectively, which are situated in close proximity to Troy and through which this company's cars on the Troy Division pass and make con-

nections for the cities of Cohoes and Waterford, populations respectively 23,000 and 5,500, which also form practically a part of a Greater Troy, making a total Troy terminal population of approximately 125,000 engaged almost

The Saratoga Division, extending from Schenectady to Saratoga Springs, is about 23 miles in length, abounding with beautiful scenery and historical land marks. This division has about 40 station stops between terminals among



Interurban Centers and Cars. All interurban cars converge at this point on State Street, the principal business thoroughfare of Schenectady. Waiting Station of the Schenectady Railway is shown at the right. Crescent Park in background

altogether in industrial pursuits. Here, too, a large tributary population incident to electric, steam and river navigation, works to the advantage of the Troy Division, which is thickly settled between terminals, having 45 station stops furnished with local service, and at some times of day a limited service, running time 1 hour 5 minutes.

which is Ballston Lake, Forest Park, one of nature's beauty spots —a gem in the rough where hundreds of cottagers and thousands of visitors seek recreation on land or the lake which is four miles long and nearly one-half surrounded by this company's property which is used for park and cottage purposes. Ballston Spa is another thriving place of 2,500

population on this division, while Saratoga Springs, the queen of watering places, is the terminal. There can be no question of the social acclaim which marks the superior sports and health-giving qualities of this noted resort which has a permanent population of about 15,000 and is increased during the summer by tens of thousands, especially during the month of August, when the racing season is on. The electric and steam connections at Saratoga also afford a large tributary population.

It will, therefore, be seen that the Schenectady Railway system supplies the main arteries for a large territory embracing the City of Schenectady on the south, east and north, while the Fonda, Johnstown & Gloversville R. R., running into the Schenectady City terminal, makes an excellent feeder from the west for a distance of over 50 miles, touching a population tributary to the Schenectady Railway system of probably 100,000 people. It can, therefore, well be said that the united advantages enjoyed serve to make the Schenectady Railway system one of the most complete in the country.



Interurban Centers and Cars. Schenectady has a population of 100,000 and is one of the foremost industrial cities in the United States. The parent plants of the General Electric Company and American Locomotive Company are located here

The following shows electric, steam and boat connections at



Interurban Centers and Cars. Bridge over the Erie Canal on the Saratoga Division

terminal and other points:

Connects at Schenectady with the Fonda, Johnstown & Gloversville (electric division), New York Central R. R., Delaware & Hudson R. R. and Boston & Maine (steam).

Connects at Albany with the United Traction Co., Albany Southern R. R. (electric), New York Central R. R., West Shore R. R., Delaware & Hudson R. R., Boston & Albany R. R. (steam), and all Hudson River day and night boats.

Connects at Troy with United Traction Co., Hudson Valley Ry. (electric), New York Central R. R., Delaware & Hudson R. R., Boston & Maine R. R., Rutland R. R. (steam), and all Hudson River day and night boats.

Connects at Saratoga Springs with Hudson Valley Ry. (electric), Delaware & Hudson R. R., Boston & Maine R. R. (steam).

Connects at Ballston Spa with Hudson Valley Ry., Eastern New York Ry. (electric), Delaware & Hudson R. R. (steam).

A population of over 500,000 is reached by the Schenectady Railway and its electric connections, which affords natural routing over this company's lines as well as a large tributary population afforded by steam road connections.

The standard interurban cars of

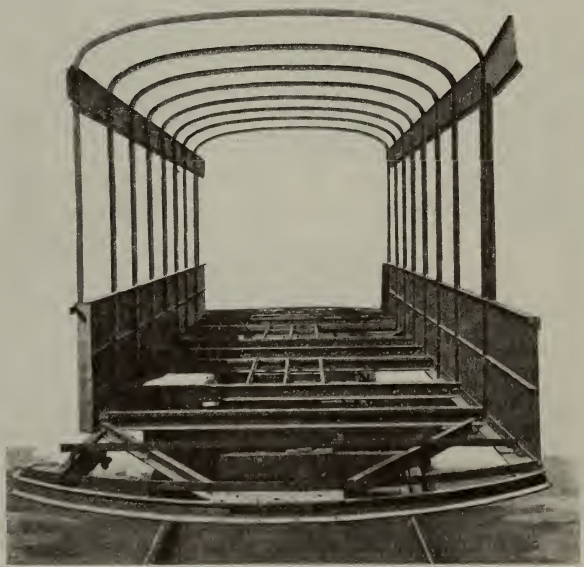
(Continued on page 251)

The Standardized "Safety Car"

IN the April, 1916, issue of BRILL MAGAZINE was published an article on the first type of lightweight, one-man car designed by C. O. Birney, Engineer of Car Design and Construction of Stone & Webster. Soon after, it was named the "Safety Car," and has become known throughout the electric railway field by its broad use on the Stone & Webster and other prominent lines and today is in use in nearly half the states of the Union and in Canada.

The American Car Company collaborated with Mr. Birney in the development of the car and has largely devoted its energies and plant to the building of these standardized cars and the organization of a system of standardized construction and maintenance to correspond.

Since the first article on the "Safety Car" appeared in BRILL MAGAZINE others have been published at frequent intervals, necessarily with considerable repetition as the type was practically perfected when the first cars were built. The only change that was found desirable was the abolishing of the special rear construction (with emergency door in the center of the end) of the single-end-operated type and making both single and double-end cars identical, except omitting operating apparatus at the rear end of the single-end type and installing extra seats instead. The accompanying illustrations of the interiors and the floor plans show how this is accomplished. Experience has proved that there are no disadvantages in having the emergency door at the corner diagonally opposite to the entrance-exit and the arrangement carries with it the great advantage of readiness of arranging single-end cars for double-end operation should the necessity arise; also there is the advantage of uniform-



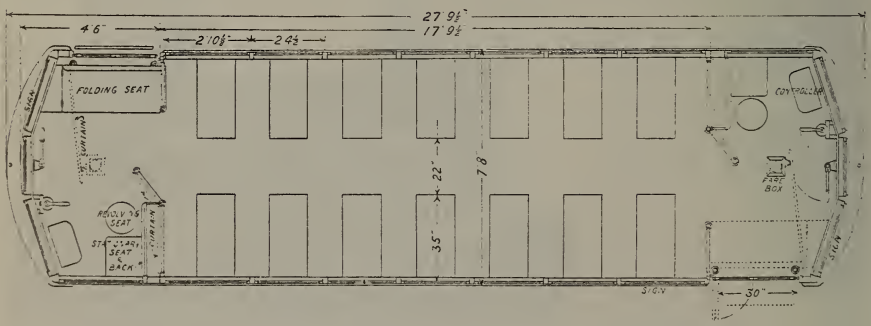
Angle side sills and crossings, channel end sill and end braces, continuous I posts and light plate girder sides form the principal frame members



THE STANDARDIZED "SAFETY CAR." The "Safety Car" is built in one form and size, but is arranged for either single- or double-end operation. Mounted on truck especially designed for this car—the Brill 78-M

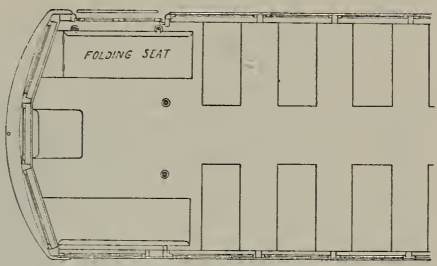
ity of construction and operation where both single and double-end cars are employed on the same railway system.

For many years there has been a wide-spread tendency to regard every city railway system as possessing a set of local conditions peculiar to itself and requiring a special type of car to meet, and the idea of producing a car adapted to the needs of the generality of railways has been considered chimerical. However, the recent coming of light-weight, steel-framed cars and one-man operation made the time ripe for such a car. The expansion of expensive long-haul business without sufficient growth of short-haul business to compensate, the slowing up of schedules on busy lines by the congestion caused by the enormous increase of automobile traffic, coupled with the abnormal cost of equipment, operation and maintenance have de-



"Safety Car" arranged and equipped for double-end operation. Seating capacity, 34. Door at end diagonally opposite entrance-exit serves as an emergency door in both single- and double-end cars

veloped a situation in many quarters that is calling for radical treatment. Naturally attention is turned first to providing a type of car that is better suited to modern needs, a car that will furnish a greater carrying capacity for the investment, that will speed up schedules, increase short-haul business, reduce the cost of operation, maintenance, and line material; and along with better, quicker and more economical service will secure greater safety. Necessity has again proved the mother of invention and the "Safety Car" is the result. The car has not only arrived with promise of fulfilling the objects of its designer, but is already established and has convincingly shown its power to relieve and overcome serious situations.



Seating plan of rear end of "Safety Car" arranged for single-end operation Seating capacity, 36

In designing the light-weight, one-man, "Safety Car" the utmost consideration was given to the adoption of dimensions, selection of



THE STANDARDIZED "SAFETY CAR". Looking forward in double-end-operated car. Front end of single-end car is identical except there is no folding seat at door and cross seats have stationary backs. In double-end car the folding seat at front door normally is raised and that at the rear door is lowered

material and equipment, and development of the details of construction, as well as the plan as a whole so that it would take its place as a completed type and fulfill its purposes to the highest possible degree; a car that would stand the most critical analysis of railway engineers, master car builders and maintenance department managers, and secure both builder and purchaser against changes and modifications. Sufficient time has elapsed and broad experience under the most exacting conditions and circumstances have proved the correctness of the plan, construction, equipment and details to an extent that warrants complete confidence in the stability and future of the "Safety Car."

The standardization of the "Safety Car" effects an enormous saving of money and time to railway companies by eliminating the necessity of making preliminary drawings, scale drawings, detail and working drawings, computation of strength of materials, patterns, templates, jigs and the mass of engineering, estimating and clerical work that goes with the usual order for cars. It does away with waste of materials, immeasurably shortens the time of construction and insures greater accuracy as workmen are habituated to the routine of making parts and building the cars.

Standardization, of course, very materially lessens the cost of maintenance and greatly reduces the time of delivery of spares and replacements; in many cases immediate shipments can be made. Much could be said of the advantages of simplifying and systemizing maintenance department work and the economy and saving of time that only a car of a completely standardized system of construction and equipment can furnish, but these are too obvious to need detailing.



The Standardized "Safety Car." Looking rearward in car arranged for single end operation. See plan on preceding page

Of the truck on which the majority of "Safety Cars" are mounted and which was designed expressly for these cars, Mr. Birney reports, "While I was in Tampa recently riding over the lines on one of their new 'Safety Cars' with the Mayor, a number of councilmen and railway officials, I was impressed more than ever with the remarkable riding



THE STANDARDIZED "SAFETY CAR." The controller handle is arranged to simultaneously cut off the current from the motors, start the sand flowing, apply the brakes, open the front door and unlatch the rear door. See platform plan in diagram on page 248

qualities of the Brill 78-M Truck. I believe it is the best single-truck that has ever been built. The railway and city officials said that the car rode as smoothly and steadily as any double-truck car they ever had on the lines."

The Brill 78-M Truck is shown on page 248 and on the back cover.

SAFETY-CAR WEIGHTS

	lbs.
Single-end body	6,300
Truck	3,300
Air apparatus .	800
Electrical equipment	2,000
Total weight . .	12,400
Double-end body	6,300
Truck	3,300
Air apparatus .	1,100
Electrical equipment	2,300
Total weight . .	13,000

Interurban Centers and Interurban Cars

SCHENECTADY, NEW YORK

(Continued from page 246)

the Schenectady Railway are 50 ft. long, over the vestibules, and seat 56 passengers. They are of wooden construction and weigh, with trucks and complete equipment, 66,200 lb. The cars are all arranged for operation at either end, are run singly and in trains of two, and equipped with multiple-unit control.

The cars are operated on private right-of-way on the Saratoga Division and on highways on the Troy and Albany Divisions. On the Saratoga Division the number of stops per mile average 2; on the Troy Division they average 6 and on the Albany Division, 4.

Interesting Cars for the Allentown Lines of the Lehigh Valley Transit Company

BRILL 77-E-1 TRUCKS

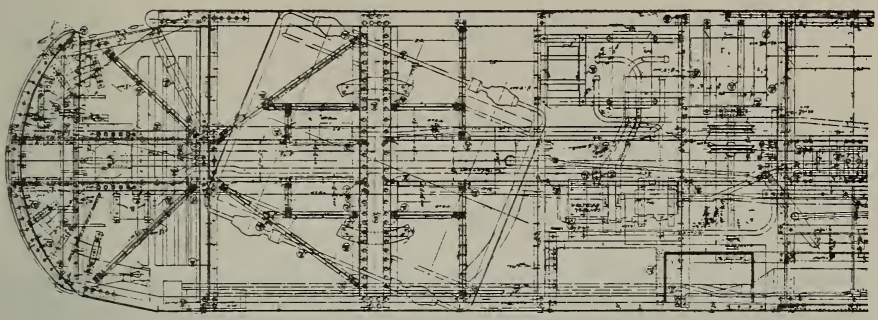
THE Lehigh Valley Transit Company has lately put into service on its lines at Allentown 12 cars of a design different from any heretofore used on the system. The entrance and exit are at center doors and there is a motorman's door at each end which can be used by passengers as an emergency exit. The cars are equipped for double-end operation and have railings to enclose the motorman's position and prevent encroachment upon his space by passengers seated on a longitudinal seat at his left. At the center of the car is a conductor's door-operating standard with handles for actuating the mechanism of the folding doors—this mechanism is of the Brill standard automatic type. Leather covered chains attached to the conductor's standard serve in place of division railings, as they can be connected to the door-posts at one side or other as occasion requires. The door opening is 4 ft. 10 in. wide and has no stanchion in the middle; the doors fold outwardly and operate in conjunction with a single folding step. By depressing the floor 3½ in. at the center and by using 26-in. diameter truck wheels, the steps are given the easy heights of 15½ in. from track to top of step and 13⅜ in. from step to floor.

The seating arrangement consists of 20 transverse seats of the Brill "Winner" type, 4 longitudinal seats for 2 passengers each at the center doors (in winter the heater occupies the space of one of these seats), longitudinal seats for 3 passengers each at diagonally opposite corners of the car at the left of the motorman's position, and folding seats at the motorman's doors, making the total seating capacity 58 in summer, when the heater is removed, and 56 in winter.

The window arrangement is of the Brill "Renitent" post construction, with spring brass casings which provide a snug fit for the lower sashes with no tendency to bind, and having among other advantages that of the sashes being interchangeable. The lower sashes raise their full height and the upper sashes are stationary and formed in continuous sections.

The windows in the ends of the car have single sashes arranged to drop into pockets and are provided with racks to hold them at various heights. Sashes, doors and interior finish are of cherry stained mahogany color and rubbed to a dull finish.

The steel bottom frame construction consists of 5 by 3½ by 5/16-in. angle sills with the wide leg placed horizontally; under the motorman's door at diagonally opposite corners a side sill extension consists of 6 by 3½ by ½-in.



CARS FOR LEHIGH VALLEY TRANSIT. The bottom frame is of light, well-braced steel construction and the sides of plate-girder type. Length of car over corner posts, 38 ft. 6½ in.; length over vestibules, 46 ft. 2 in.; length over anti-climbers, 47 ft.; centers of side posts, 2 ft. 6 in.; width over posts, 8 ft. 4 in.; height from track to top of floor at highest part, 2 ft. 8⅜ in.; from track to underside of sill at highest part, 2 ft. 6½ in.; from track over trolley board, 11 ft 1⅜ in.; bolster centers, 26 ft. 6 in. Seating capacity, 56 with heater and 58 without. Weight of complete car, 40,750 lb.

angle. Light channel center sills are attached to the pressed steel crossings with angle brackets, and 2 by 1½ by ¼-in. tees are used for diagonal braces at each end of the car and gusseted to the center sills.

The body frame is composed of 2 by 2½ by 3/16-in. T-posts, 2½ by 1½-in. vestibule T-posts, 3/32-in. side sheathing and letter panels, and 3 by 2 by ¼-in. angle top plates.

The roof is of the usual plain-arch type supported on pressed steel rafters and sheathed with 1½-in. tongued and grooved poplar boards.

The floor is double, the lower layer being of ¾-in. yellow pine, and the upper of ¾-in. maple; oak strips are laid in the aisle between



The 12 cars are mounted on Brill 77-E1 Trucks equipped with 26-in. wheels. The floor is depressed 3½ in. at side entrance. The cars are equipped for double-end operation, have wide center doors at both sides and motorman's door at diagonally opposite corners

the cross seats and at the doors. Trap-doors are provided over each motor and are framed in oak. Two trolley-boards, 7/8 by 5 7/8 in., extend the full length of the car-body and are supported on oak cleats.

Included in the equipment are headlights, fenders, illuminated window signs, switch iron holders, flag and lamp brackets, trolley retrievers, push buttons on each post with bells and buzzer system, car jacks and fire extinguishers.

The Brill 77-E-1 trucks on which all the cars are mounted have a



CARS FOR LEHIGH VALLEY TRANSIT. The windows have Brill "Renitent" posts with spring-brass casings. Upper sashes stationary and framed in two sections to the car side. Conductor's door operating standard shown at center; leather-covered chains serve instead of dividing railings

double-acting hand brakes, automatic air brakes and air couplers, air operated sand boxes, platform gongs and signal bells, stationary wheel-base of 5 ft. 1½ in.; 26-in. wheels; axles 4½ in. at motor bearing; 5 in. at gear and wheel-seat; and 3¾ by 7-in. journals.

One Hundred Peter Witt Cars for Buffalo

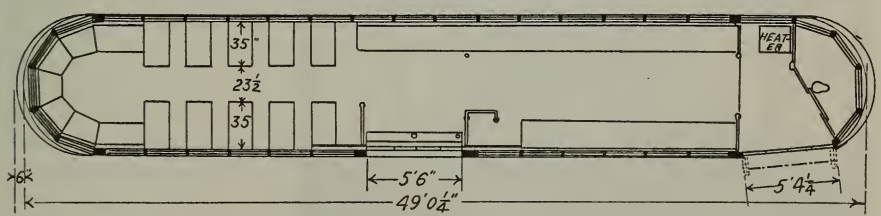
RENITENT WINDOW POST CONSTRUCTION

FIFTY cars of the front-entrance, side-exit, pay-as-you-pass type, built by The G. C. Kuhlman Car Company, have been put in operation on the lines of the International Railway Company, of Buffalo, N. Y., to reduce the length of stops at busy transfer points and thus increase the running schedules during rush hours. Another order for fifty cars of the same type will soon be completed.

Cars of this type have recently been furnished to the following companies: The Cleveland Railway Company, New York State Railways at Syracuse and Utica, the Toledo Railways & Light Company, Buffalo & Lake Traction Company's lines at Erie, and the Mahoning & Shenango Railway & Light Company's lines at Youngstown. Cars of the Peter Witt type have previously been described in BRILL MAGAZINE, and as the pay-as-you-pass method of fare collection with the conductor at the center of the car, leaving the front end as a loading platform is now well known, it is unnecessary to describe again the features and their numerous advantages.

The construction of Peter Witt cars has been standardized and in general consists of plate girder sides, angle side sills, T-posts, flat bar belt rails, pressed steel letter panels and angle top plates. The end construction is particularly well designed to resist hauling and buffing strains, and the front platform, which is 7 ft. 6¼ in. long, is constructed and reinforced to prevent any possibility of sagging or loosening. The draft knees are braced to transmit strains to the side girder plates and the whole arrangement gives a wide margin of strength to withstand any sudden drawbar strain.

The interiors are finished in cherry of plain sanitary construction and secured in a manner which makes all parts easily removable. The side and rear windows have stationary upper sashes of the continuous type, and lower sashes arranged to raise 21 in. above the window rest. The window posts are of the Brill "Renitent" type, which are of spring brass and permit the lower sash to be removed



Height from track to center-exit step, 14 5/16 in.; height of two center-exit risers, 12⅛ in.; cross ramp of center steps, ⅛ in.; height of entrance step, 14 5/16 in.; from step to platform, 13¼ in.; cross ramp in platform, 1¾ in.; from platform to floor, 9½ in.; diameter of truck wheels, 22 and 33 in.; bolster centers, 25 ft. 6 in. Seating capacity, 54. Weight of complete car, 18 tons



PETER WITT CARS FOR BUFFALO. The cars have all steel upper and under frames and plate-girder side construction. Mounted on Brill single-motor trucks

without tools and make all sashes interchangeable. The front vestibule sashes are designed as follows: The sash under the sign sash is stationary; the center sash and the sash at the left of the center are arranged to drop and are held at various heights by sash locks; the sashes at the side of the vestibule are stationary. All sashes have brass stiles and wooden rails. Two single sliding doors are provided at the center exit opening. The front entrance doors consist of two two-leaf sections arranged to fold outwardly. All the doors are glazed with clear glass in the upper panels and with clear wire glass in the lower panels. A glazed partition is brought straight across the platform to a point just beyond the heater and then diagonally to the vestibule corner post forming a motorman's cab. Cherry is used for the interior woodwork, including doors, sash-rails and moldings.

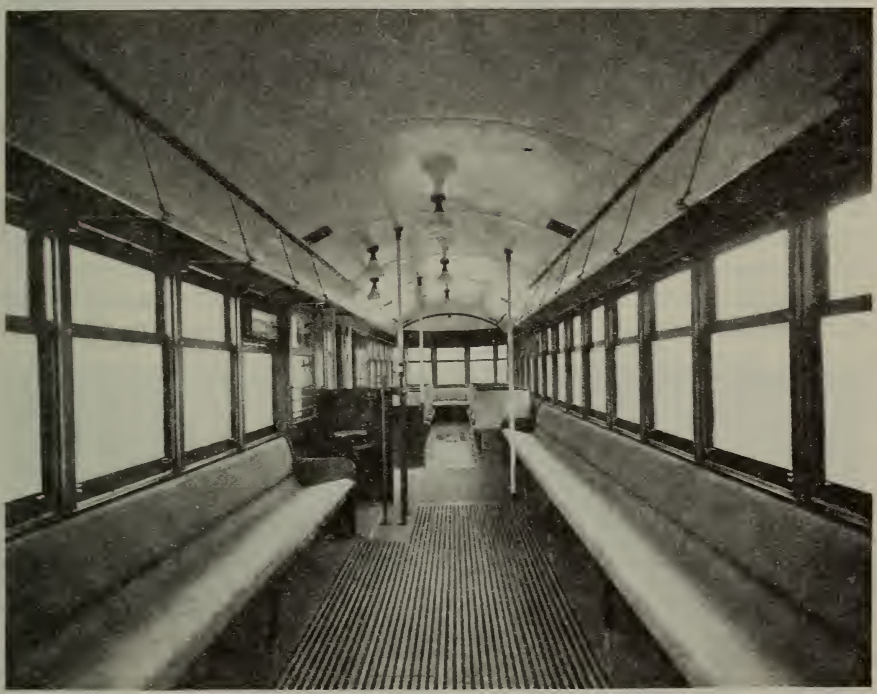


Long-haul passengers naturally endeavor to occupy the more comfortable transverse seats at the rear

The seating arrangement is shown in the accompanying diagram and interior views. Seats for the motorman and conductor are furnished, the latter of which is arranged to fold out of the way when not in use. In place of hand straps a 1-in. white porcelain enameled pipe is furnished and extends over the longitudinal seats only. The division railings,

stanchions and farebox stand are also made of 1-in. iron pipe enameled white. With the exception of the front and rear vestibule sashes and the sashes behind the sliding door pockets all the windows have iron wire guards of 2-in. diamond mesh in channel iron frame secured to the bottom rail of each sash and enclosed in a pocket (formed by the outer steel sheathing and the inner finish below the belt rail) when the sash is in its lowered position.

The roof is framed with structural steel shapes secured to the continuous steel letter-board, which in turn is secured to the top of the side and corner posts. The sheathing of tongued and grooved poplar boards is covered with No. 8 cotton duck in one piece, laid in white lead and oil. The hood-frames are a continuation of the body-roof frame and are made in removable sections; the sheathing is composed of a double thickness of 3/16-in. poplar boards.



PETER WITT CARS FOR BUFFALO. The front end of the car serves as a loading platform and passengers riding short distances usually occupy the longitudinal seats. The car is divided into prepayment and postpayment sections by the conductor's central position, hence the expression "pay-as-you pass"

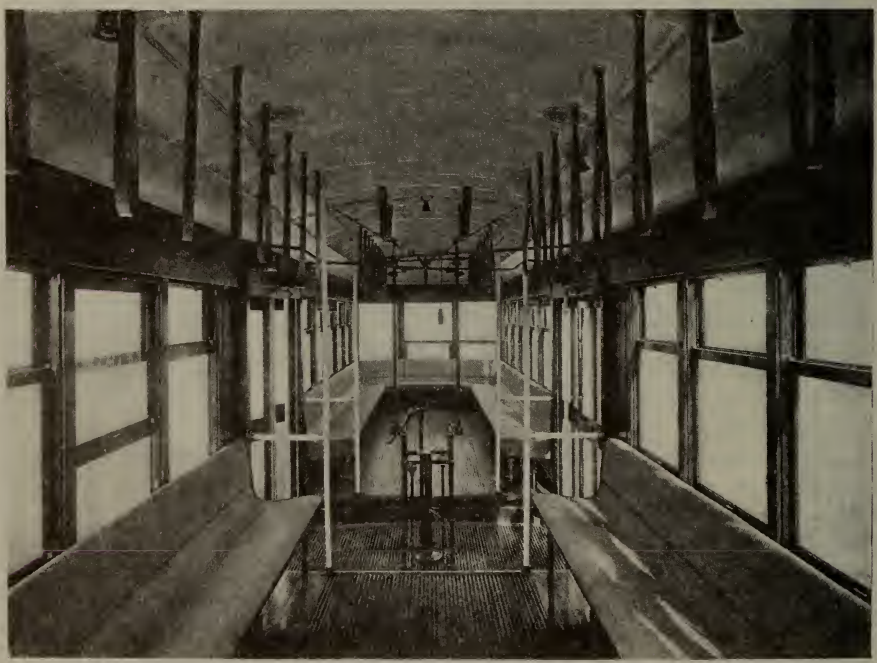
The trucks on which the cars are mounted are the Brill 62-E-2 type, which have a wheelbase of 4 ft. 10 in., and 22 and 33-in. diameter wheels. They are spaced at 25 ft. 6-in. bolster centers.

Low-Center-Entrance Trail Cars for Cumberland County Power & Light Co., Portland, Me.

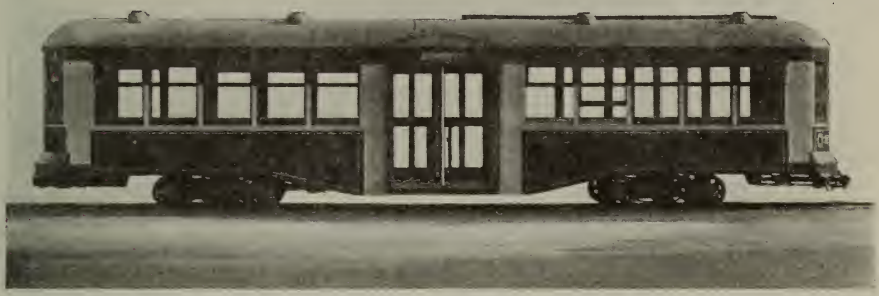
BRILL 53-F TRAIL TRUCKS

THE Wason Manufacturing Company has furnished to the Cumberland County Power & Light Company, of Portland, Maine, 8 double-truck, center-entrance trail cars which are for use on a heavy traffic section of the company's lines between Westbrook and Portland, and are a distinct innovation, as passenger trail cars have never been operated on the system. Besides increasing the traffic capacity of a single-track line, the new equipment has the advantages of reducing accidents and providing a more satisfactory system of fare collection. The run on this section is 6 miles long, ending in a loop at Portland and in a wye at Westbrook. The fare is ten cents and a farebox method of fare collection has been inaugurated. The average number of stops is 6 to 7 per mile and the average speed maintained is 15 miles per hour.

The cars are framed and sheathed with steel and are built with a bottom frame depressed enough at the center to avoid using a step outside the car. The side



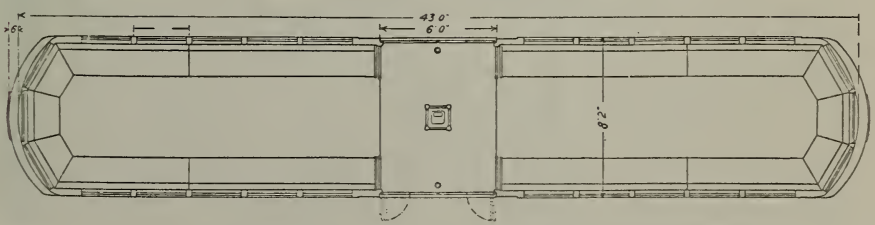
A fare box and handles for operating doors, air brakes and hand brakes are located together at the conductor's position at the center of the car



CARS FOR PORTLAND, ME. Eight of these steel trail cars, built by the Wason Manufacturing Company, are supplementing the regular motor car equipment of a busy line between Portland and a suburban town. Mounted on Brill 53-F Trail Trucks equipped with 22 in. wheels

construction is of the plate-girder type, using 3/32-in. steel plate in four sections to a side, light T-posts, 3 by ½-in. flat bar belt rails, 3 by 2½-in. side plate angles and a substantial reinforcement of all parts around the center doors. The floor of the center platform has a ramp of 1 in., and from the center platform to the bolster at each end the floor has a ramp of 3 in., which with 22-in. truck wheels makes the height from the railhead to the top of the tread at the doors, 13⅜ in., and the riser between the platform and the car floor, 9⅜ in. The 4-part folding door, which folds in a two-leaf section at each door post on each side of the car, is operated by handles at the side of the farebox at the center of the platform. The doors are glazed in the upper part with double-strength American glass and the lower panels are glazed with clear wire-glass. Double sash windows, the lower sashes arranged to raise their full height and the upper framed continuously from the corner posts to the side door posts, enclose the sides, and the ends are furnished with three single drop sash windows. The inside finish is of mahogany with painted ceilings of carline finish.

The Brill 53-F trucks have a wheelbase of 5 ft., and are spaced at 24-ft. bolster centers.



Height from track to top of door sill, 13⅜ in.; cross ramp of center platform, 1 in.; from platform to floor, 9⅜.; ramp of floor from center platform to bolster, 3 in.



The cars have plate-girder side construction, I-beam center sills, angle corner posts and T side posts

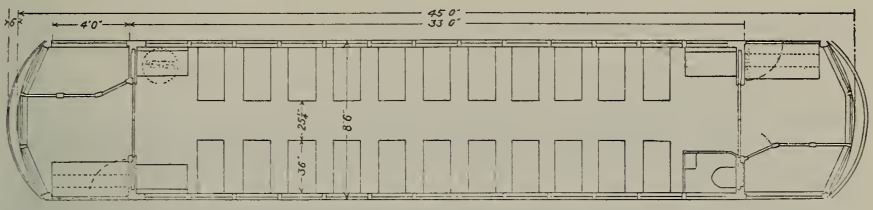
Interurban Cars for Murphysboro & Southern Illinois Railway

BRILL 27-M. C. B. TRUCKS

THE Murphysboro & Southern Illinois Railway Company has lately completed its 8-mile line between Murphysboro and Carbondale and has commenced operation with an initial equipment of handsome cars built by the American Car Company and mounted on Brill high-speed trucks.

Murphysboro is an important railway and commercial center in the southern part of Illinois in a fertile and populous region 10 miles east of the Mississippi River and about 75 miles below St. Louis. Carbondale is at the junction of several steam railways and although connected by one of them with its neighboring city, the amount of passenger traffic between the two points and the considerable population in the intervening territory promises to make the electric route both popular and profitable. The line is under the same management as the local system of Murphysboro.

The cars may be generally described as double-end operated, steel frame cars for straight passenger service and containing a toilet room at one end and motorman's cabs at diagonally opposite corners. They have flush platforms with triple steps and are built on an all-steel bottom frame with T-post upper framing and plate-girder side construction. The bottom frame has 5 by 3½ by ⅜-in. angle side sills, two 7-in. I-beam center sills spaced 13½ in. from center to center, 4-in. channel crossings, open truss-form bolster 9 by 1¼ in., and 7-in. channel bumpers. Long diagonals extend from the center of the side sills to the bolster at each end, and short diagonals brace the corners from the bolster



CARS FOR MURPHYSBORO & SOUTHERN ILLINOIS RY. Height from track to underside of side sills, 3 ft. 8¼ in.; from underside of side sill over trolley board, 8 ft. 10¾ in.; from floor to center of ceiling, 7 ft. 10 in.; from track to step, 17¾ in.; three risers, 11½ in. each. Seating capacity, 50. Wheelbase of trucks, 6 ft.; diameter of wheels, 33 in.; truck centers, 23 ft.

to the large gusset plates at the body corners.

In the body frame the corner posts of 1½ by 1½ by 3/16-in. angle, and tee side posts of the same dimensions, extend from the side sills to the top plates, to which they are securely riveted. Girder plates of No. 12 sheet steel are 35½ in. wide and riveted at the top to a 2½ by 2 by ¼-in. angle, which is cut and fitted around the posts. No. 16 sheet steel is used for the letter panel and is pressed at the bottom to form a capping for the upper window sashes and at the top is riveted to a 2 by 2 by ¼-in. angle top rail. Steel rafters at the top of each post support the plain-arch roof.

The inside finish of the car is of cherry, including the doors, linings and mouldings. The upper side sashes are stationary and framed in a continuous piece; the lower sashes raise their full height. Eleven transverse and two longitudinal corner seats are on one side of the car and 11 transverse and one longitudinal on the other. These are of Brill "Winner" type covered with rattan and furnish a total seating capacity of 50.

Mutually-operating double sliding doors at the body ends have an opening of 3 ft. 10 in. The flooring is of 13/16-in. tongued and grooved yellow pine.

Included in the equipment are, a hot water heating system, air brakes, hand brakes, air sanders, push buttons in each side post, M. C. B. radial draw-bars, alarm gongs, trolley retrievers, tail lamps, and wooden pilots.



The upper sashes are of the continuous frame type; the lower sashes raise their full height. Brill "Winner" Seats

City Cars for Trenton & Mercer County Traction

RENITENT WINDOW POST CONSTRUCTION

THE Trenton & Mercer County Traction Corporation has lately placed in service on its lines at Trenton, N. J., 10 cars built by The J. G. Brill Company. The cars are a 48-passenger, steel-framed, steel-sheathed, prepayment design for double-end operation and with doors at both sides of platforms; they are mounted on trucks with small diameter wheels, and thus the steps are of easy height.



Brill "Renitent" Window Posts and Brill "Winner" Seats are prominent features of the attractive interior of these cars

The side sills are composed of 5 by 3½ by 5/16-in. angle with the 5-in. leg placed horizontally and reinforced at the bolster with 5 by 3½ by 5/16-in. angle, 30 in. long, to relieve the strain on the horizontal leg. The end sills are of ⅛-in. channel strongly gusseted to the side sills; crossings of ⅛-in. pressed steel are riveted to the side sills with two ⅝-in. rivets through the lower flange. The bolsters are of cast steel bolted to the side sills and to the reinforcing angle over the side sill with turned bolts. Eight-inch channel outside knees and four-inch center knees support



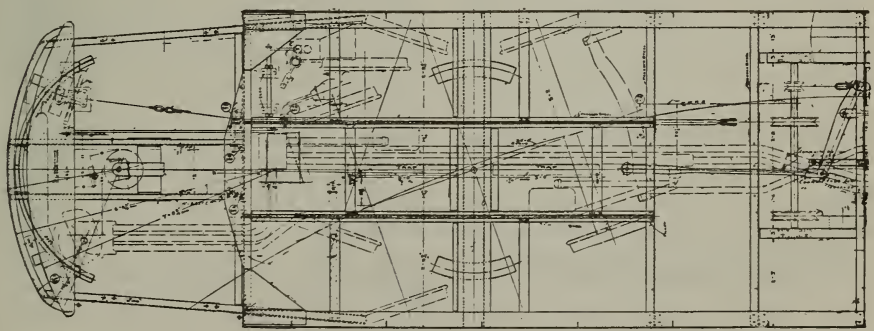
CARS FOR TRENTON. Length of body over corner posts, 31 ft. 5 in.; length of platforms, 5 ft. 6 in.; length of car over vestibules, 42 ft. 5 in.; length over bumpers, 43 ft. 5 in; width over posts, 8 ft.; extreme width, 8 ft. 2 in.; centers of side posts, 29 in.; from track to top of step tread, 14½ in.; step to platform, 14 in.; from track to top of trolley board, 11 ft. 9 in.; centers of bolsters, 19 ft 9 in. Seating capacity, 48. Mounted on Brill 77-E1 Trucks equipped with 26-in. wheels

the platforms, which are 5 ft. 6 in.

The body framing comprises 2 by 2 by ¼-in. and 5/16-in. T-posts extending from the side sill to the top rail; the belt rail is of 3 by ½-in. steel covered with a pressed steel window sill capping. Steel plates for the side sheathing are of 3/32-in. material.

The roof is of the plain-arch type, supported on 3/32-in. pressed steel U-shaped carlines at each side-post. The roof and hoods are sheathed with ½-in. poplar boards and covered with No. 8 cotton duck. Six ventilators are placed along the center of the roof and the trolley-boards extend over them.

Under the seats the floor is of 1¼-in. yellow pine boards, with corrugated maple flooring of the same thickness for the aisle. Maple laid crosswise constitutes the floor of the platforms, which are flush with the car floor. The platform openings are provided with 4-part folding doors in two



The load is borne on the plate girder side construction, including angle sills with 5 in.. leg placed horizontally. Extra large gusset plates reinforce the connection of the side and end sills

sections, one section to fold out against the body corner post and the other to fold against the vestibule post. The doors and steps are operated by ball-bearing mechanism of Brill standard type.

The side windows have stationary upper sashes which are formed in a continuous piece the full length of each side of the car and lower sashes that are arranged to raise their full height.

Cherry is used for the interior finish of the car, including doors, sashes and mouldings; the ceiling and side lining are of composition board. A 7/8-in. air space is provided between the outside and inside sheathing below the side windows. Pipe stanchions of 1-in. pipe painted black are furnished at the body corner posts and on each side of the platforms near the vestibule corner posts. Bronze trimmings are used throughout. Wooden grabhandles in bronze sockets are installed on the inside of the body corner posts. On each side of the car and extending full length are five-bar window guards hinged to drop down for cleaning windows. Five leather handstraps are provided over each corner longitudinal seat and mounted on individual brackets. Illuminated window signs are located over the right-hand vestibule sash at each end and over the center window on each side.

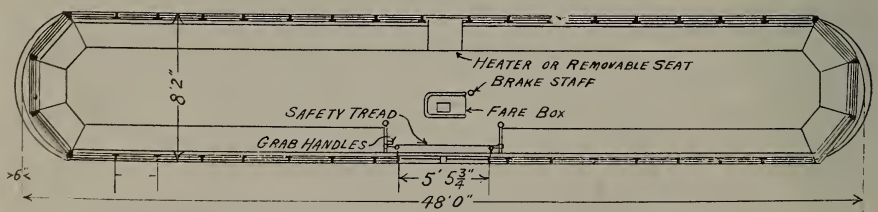
Brill "Winner" seats, 36 in. wide, leave room for a 23 7/8-in. aisle. Eight seats are on each side of the aisle, and longitudinal corner seats at the ends of the car each occupy the space of two windows.

The cars are all mounted on Brill 77-E-1 trucks with 5 ft. 6-in. wheelbase, 26-in. wheels, 4-in. axles, 3¾ by 7-in. M. C. B. journals. Gage of track is 5 ft. 2 in., and radius of shortest curve, 40 ft.

Additional Center-Entrance Trail Cars for Cleveland

BRILL 67-F TRUCKS

THE G. C. Kuhlman Car Company has furnished to the Cleveland Railway Company 25 trail cars of a type similar to 100 built several years ago. As the photograph of the interior and the plan view show, the seating plan is a simple longitudinal arrangement,



Height from track to step, 15 7/16 in.; from step to floor, 14 in.; from track to top of floor, 29 7/16 in.; from floor to center of ceiling, 7 ft. 10½ in. Seating capacity, with heater, 59; without, 60; standing capacity, 70; total passenger capacity, 130

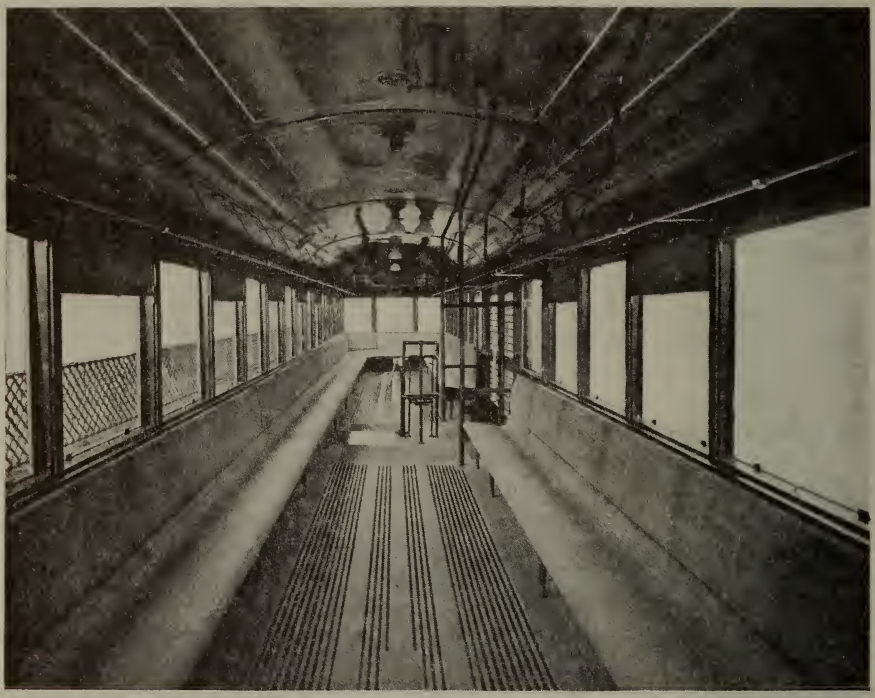
semi-circular at the car ends, accommodating 60 passengers in summer and 59 in winter, when a heater takes the place of a section of the seat opposite the entrance.

The cars are carried on trucks equipped with 26-in. wheels, which brings the floor height 29 7/16 in., avoiding the necessity of having an outside step and providing an easy inside step from the door sill to the floor. The signal system consists of a 5-in. gong on the front letter panel operated by a cord extending through the entire car and a push-button installed on the money tray of the farebox which operates a buzzer in the motor car ahead; push-buttons on each post ring an electric signal bell near the conductor's position. The cars are equipped with airbrakes and automatic couplings, etc., and have an equalizing handbrake system connected to the levers of the airbrake system and operated from a brake staff braced to the farebox. The valves controlling the pneumatic mechanism which operate the doors are located under the money tray of the farebox stand. The doors are carried on ball-bearing sheaves and each door is operated by its own engine, which is installed under the adjacent longitudinal seat. A post divides the doorway and each door is equipped with a rubber hose buffer.

All windows are fitted with a single metal sash arranged to drop into pockets between the posts, with the exception of the door pocket windows, which have a stationary outer sash and a hinged inner sash. Fifteen 6-in. galvanized ventilating ducts furnish a passage for air between the interior of the car and a draft duct on the roof which is framed with aluminum castings supporting an upper roof having ¼ by 1⅜-in. maple weather blinds or louvers at the sides and ends. The seats and backs are made over pressed steel frames padded with ½-in. hair felt and covered with canvas-lined, twill-woven rattan.



TRAIL CARS FOR CLEVELAND. Latest type of Cleveland trailer, mounted on Brill 67-F Trucks. Twenty-five of these cars recently were built by The G. C. Kuhlman Car Company



TRAIL CARS FOR CLEVELAND. The doors, air brakes and signal system are operated from the fare box stand at the center. Metal-framed sashes drop into wall pockets. A hand rail of convenient height is provided over the seats

Red cherry is used for the interior finish, doors and other woodwork. The 1½-in. pipe stanchions and grab handles near the doors and the hand rails over the seats are enameled to correspond with the finish of the car.

The cars are built on a structural steel underframe consisting of light channel center sills and trussed channel crossings. The crossings are gusseted at intersection of the center sills and at the side sills with large plates. The sides, including the side sill, girder plates, belt rail, angle for attaching cross sills and angles for attaching the posts, form the load bearing members of the frame. The bottom angle of the step side of the frame is depressed 15 in., for a distance of 12 ft., and is reinforced at the depression by an angle braced to the center sills with angles. The door header is built up of an angle and plate extending the full length of the door pockets and of another angle which is the continuation of the door post angle; these members are riveted to a steel letter panel extending the full length of the side of the car. The door posts at each side of the opening are built up of plate with an angle riveted along each edge, one of which continues around the sides and top of the opening.

Semi-Convertible Interurban Cars for Slate Belt Electric Railway, Penn Argyl, Pa.

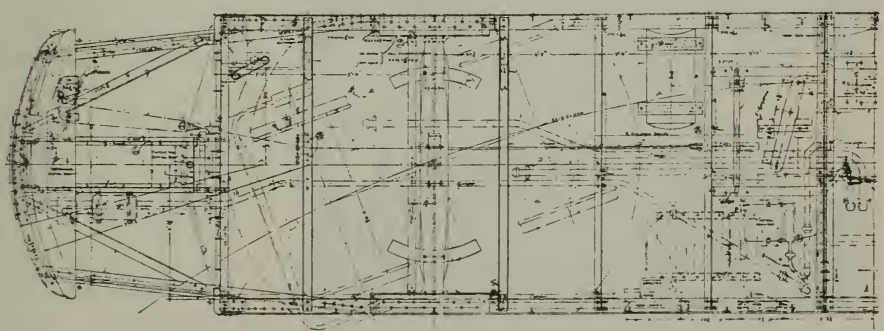
BRILL 27-M, C. B.-2-X TRUCKS

FOUR passenger and smoking cars mounted on Brill 27-M. C. B.-2-X trucks recently were shipped to the Slate Belt Electric Street Railway Company, of Pen Argyl, Pa., by The J. G. Brill Company.

This railway system connects the towns of Pen Argyl, Bangor, Belfast, Nazareth, Wind Gap and Stroudsburg in the high rolling country south of the Pocono Mountains midway of the eastern border of Pennsylvania and a short distance southwest of the celebrated Delaware Water Gap. The territory served is thickly populated and the fine scenery and bracing air attracts a large and growing number of summer guests each season.

The cars are constructed with all-steel framing and sheathing; they have the Brill semi-convertible window system with tandem sashes and are divided into a main and a smoking compartment, the former of which has a toilet room next the partition.

The bottom frame is composed of 7 by 3½ by ½-in. angle side sills riveted to 3/32-in. side plates, channel end sills and ⅛-in. pressed steel crossings. Channel platform knees are of 6-in. section for the outside and 4-in. for the center. In the body framing corner posts of 3/32-in. steel extend from the sub T-posts entirely around the corner and up to the side of the bulkhead opening. Side posts of T construction extend from the under side of the side sill to the top rail and are riveted to both. The belt rail of 3 by ⅛-in. steel is covered with a pressed steel window sill capping extending down on the outside of the belt rail and taking the rivets which secure the belt rail to the side sheets. Top rails of 2½ by 3¼ by ¼-in. angle extend the full length of the car



Angle side sills, channel end sills and pressed steel crossings, compose the light bottom frame—the load is carried on plate-girder sides



CARS FOR SLATE BELT ELECTRIC RY. Length of body over corner posts, 36 ft; length of platforms, 5 ft.; length of body over vestibules, 46 ft.; length over bumpers, 47 ft.; width over sheathing, 8 ft. 2 3/8 in.; height from track to top of floor, 3 ft. 6½ in.; from rail to top of trolley board, 12 ft. 1⅛ in.; centers of side posts, 2 ft. 8 in. Seating capacity, 46

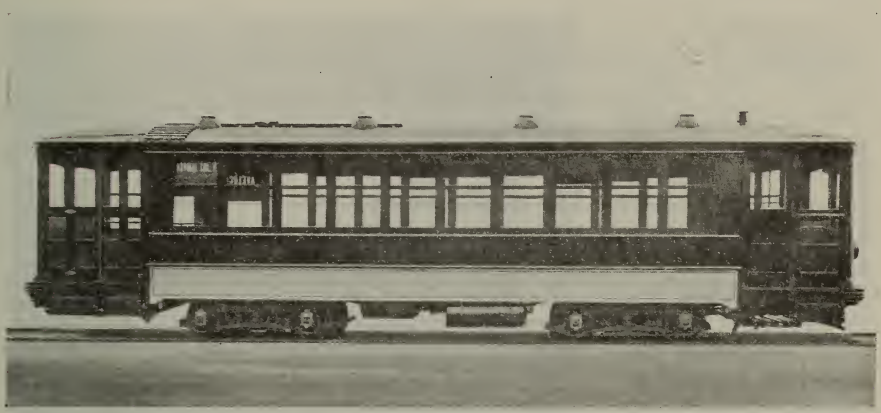
and are riveted to the top of each side-post and to the 3/32-in. steel letter panel.

Mahogany is used for the interior finish, including all doors, sashes and mouldings. The ceiling and side linings are of composition board. One side of the passenger compartment is furnished with 7 transverse seats with reversible back, one transverse seat with stationary back against the partition and a longitudinal corner seat; the other side has 6 transverse seats with reversible backs and one with stationary back against the toilet room, and a longitudinal corner seat. The reversible back seats have high backs with head rolls and are upholstered with plush. The smoking compartment has two transverse seats with reversible backs and one longitudinal corner seat on one side of the aisle and the other side has two transverse seats with reversible backs, one transverse seat with stationary back and one corner seat.



The window system is the Brill Semi-convertible type in which the sashes are hinged together and slide into a roof pocket. Brill "Winner" Seats

The Brill 27-M. C. B.-2-X trucks have 6-ft. wheelbase, and 33-in. wheels.



Forty-passenger, single-end, composite-frame car, mounted on double-motor trucks equipped with 24-in. wheels

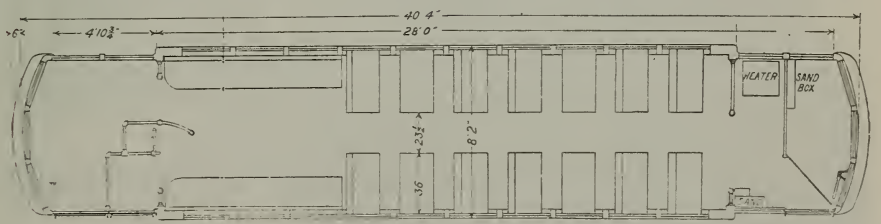
Pay-Within Type for Omaha, Lincoln & Beatrice Railway

BRILL 77-E-1 TRUCKS

AMONG recent shipments of the American Car Company was an interesting type of pay-within car mounted on Brill 77-E-1 trucks for the Omaha, Lincoln & Beatrice Railway Company, of Lincoln, Nebraska. An article on a "Safety Car" furnished to this company was published in the May, 1917, issue of BRILL MAGAZINE.

The car illustrated is of composite steel and wood framing, the bottom framing consisting mainly of angle side sills 5 by 4 by ⅜ in., riveted to the bottom edge of 36 by ⅛-in. steel girder plate, a center sill of one 8-in. channel placed with flanges downward, end sills of 10-in. channels with flanges outward, channel crossings, and built-up truss-form plate bolsters. The platforms are flush with the car floor and supported on channel knees of open truss-form.

The rear platform is provided with entrance and exit doors of the two-leaf folding type, which are

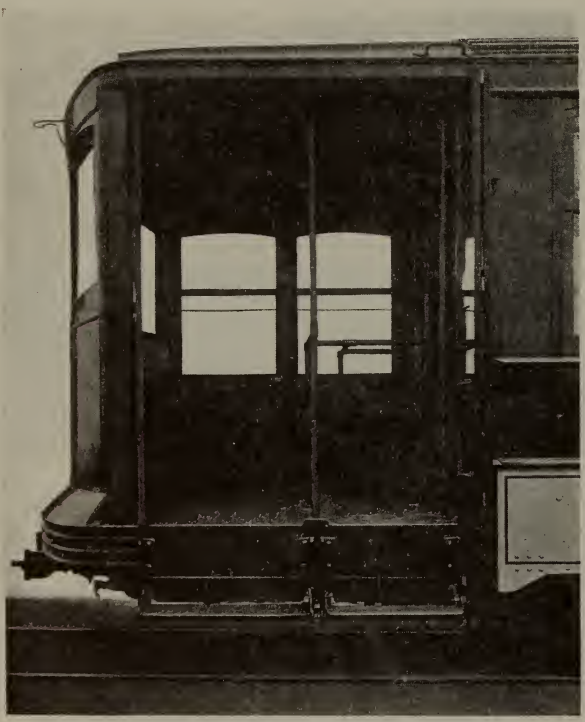


Height from track to underside of side sills, 22 5/16 in.; from underside of side sills over trolley boards, 8 ft. 7¾ in.; from floor to center of ceiling, 7 ft. 6 in.; from track to step, 16½ in.; step to platform, 14 in. Seating capacity, 40

operated from the conductor's central position just inside the carbody by means of a quill staff. The doors can be opened or closed separately or together. The front exit is provided with a sliding door which is operated by the motorman by means of a revolving handle. The step is arranged to be entirely down when the door is opened about eight inches.



CARS FOR OMAHA, LINCOLN AND BEATRICE RY. Interior finish is mahogany throughout. Upper sashes stationary; lower sashes rise



Platforms are flush with car floor. Doors operated from quill shaft. Front platform has sliding door

White ash is used for the body framing, including the posts, which are tenoned into a yellow pine sub-sill at the bottom of the side plate. A strap bolt on each side of the posts passes through the wood sub-sill with a nut underneath the horizontal leg of the angle side sill.

The inside finish is mahogany throughout, including doors, sashes and mouldings. Ten windows on each side have stationary upper sashes and lower sashes arranged to raise their full height. The stationary-back, rattan covered seats, are of Brill Manufacture.

Single-Truck, Low-Center-Entrance Cars for Lewiston, Augusta & Waterville Street Railway

DOUBLE-END OPERATION

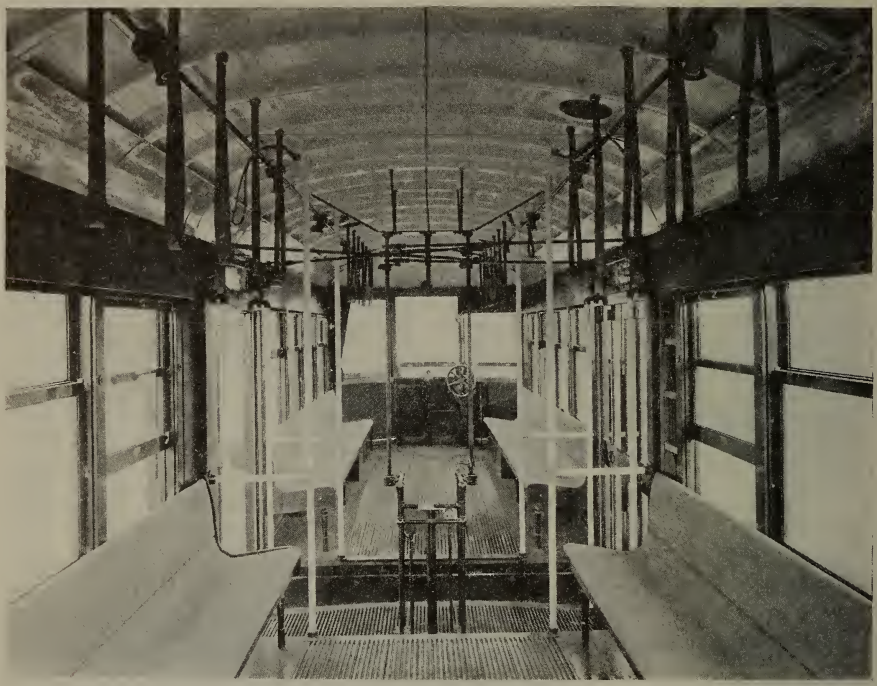
SIX cars of the type illustrated have been furnished to the Lewiston, Augusta & Waterville Street Railway Company, of Lewiston, Maine, by the Wason Manufacturing Company. The cars have been placed in service on the local systems of the cities of Lewiston and Auburn, which are on opposite banks of the Androscoggin River and have populations respectively 27,000 and 16,000. The new cars have a larger capacity than other single-truck cars which have been in operation and will supplement the former equipment to provide a shorter headway required by the growth of traffic. The average speed called for by the schedules is about 9 miles an hour.

The cars are built on an all-steel bottom frame depressed at the center to avoid the necessity of a step. The height from track to the step-tread at the center entrance is 14½ in.; the center platform is ramped two inches to the center; from center of the platform to the car floor is 12 in., and the car floor has a ramp of two inches, making the height from the track to the upper surface of the car floor over the wheels 30½ in. The truck wheels are 26 in. in diameter.

The floor is double and the upper layer, 13/16 in. thick, is of maple. Mahogany is used for the interior finish, including the doors, and the ceiling and wainscoting are of composition board. The side windows have stationary upper sashes and lower sashes arranged to raise their full height.

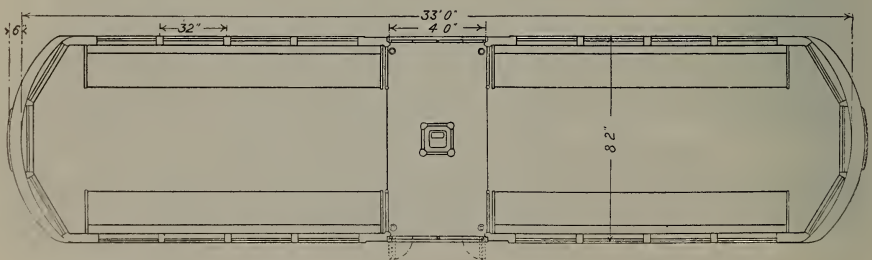


The twin city railway system at Lewiston and Auburn has placed in service six of these steel framed and sheathed cars built by the Wason Manufacturing Company

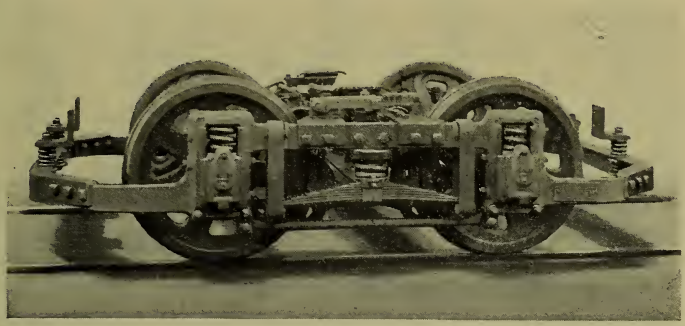


CARS FOR LEWISTON, AUGUSTA AND WATERVILLE ST. RY. The stepless center entrance and the longitudinal seats accelerate movement of passengers in and out on the busy short-haul lines

At the car ends the sashes drop into pockets and the center sash is arranged to be held at various heights. The four-part folding doors at each side have clear glass in the upper part and wire glass in the lower. They are operated by pneumatic mechanism from the conductor's position at a stand in the center of the platform containing a farebox. Included in the equipment are Brill ventilators, sandboxes, platform gongs and other patented specialties.



Height from track to top of door sill, 14½ in.; cross ramp in platform, 2 in.; platform to floor, 12 in.; ramp in floor, 2 in.



For Severe City Service

THE 76-E Truck is used under most of the modern cars in city service where heavy grades and heavy loads call for four motors per car. It has the same spring system and consequently the same superior riding qualites as the Brill Single-motor Truck

THE J. G. BRILL COMPANY

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Cable Address: "Brill," Philadelphia

London Office
110 CANNON ST., E. C.
Cable Address: "Axles," London

AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS
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Agencies

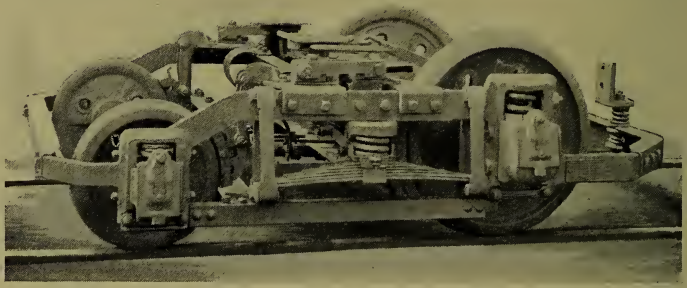
AUSTRALASIA—Noyes Brothers, Melbourne, Sidney, Dunedin, Brisbane, Perth

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

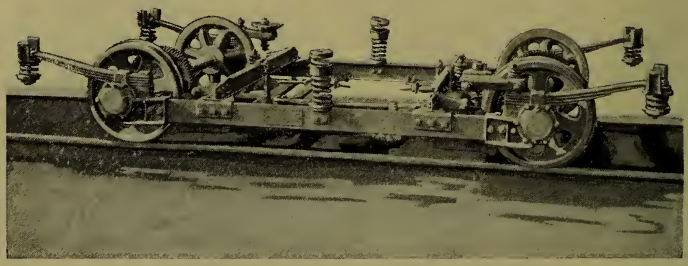
ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal



For All-round City Service

THE 39-E Single-motor Truck is built with a standard wheelbase of 4 ft. 10 in.; the driving wheels are from 30 to 34 in. diameter, and the pony wheels, 19 to 23 in. Solid forged side frames, graduated spring system, bolster guide, "Half-ball" brake hangers are distinctive Brill features



For Light-weight Cars

THE 78-M Truck has proved that a single-truck car can be made to ride as smoothly and steadly as a double-truck car. It is the only single-truck that has a graduated spring system—an automatic device for carrying the carbody with up to a seated load on easy acting spiral springs

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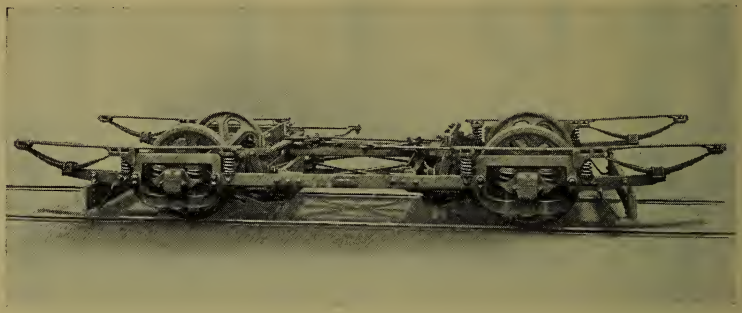
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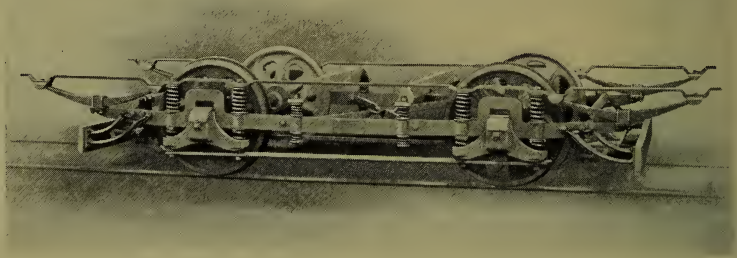


Buffalo Terminus of
New High Speed Line of
International Railway Company



FOR LONG FOUR-WHEEL CARS

THE Radiax is the correct truck for cars measuring 22 to 26 feet over the corner posts, or for shorter cars for railways having unusually short curves. It is built with any wheel base from 8 to 13 feet. The Radiax is the one non-rigid-axle truck that combines smooth riding and successful radiation with freedom from side swaying and "snaking" on straight track



BRILL STANDARD SINGLE-TRUCK

THE 21-E Truck is the standard type for all four-wheel cars except those that are extra long or extra light. Wheel base from 6 to 9 feet. Maximum weight of carbody with equipment and passenger load, 24,000 lb. The "Wide-wing" journal box is one of the distinctive features of the 21-E Truck and adds very considerably to its strength as well as to its riding qualities



Edward C. Faber

Manager, War Board, American Electric Railway Association
Second Vice-President and General Manager, The Aurora, Elgin and Chicago Railroad Company

"Under present circumstances it is the patriotic duty of each American citizen to bend every effort toward relieving the present traffic congestion and toward placing on the highest plane of efficiency every existing transportation facility. This will entail co-operation on the part of everyone concerned, including the public, and this must be constantly borne in mind in any consideration of the subject. It is evident that the electric railways can be used to supplement steam railroad service, thus relieving the steam roads of a considerable amount of short-haul traffic, so as to render steam road cars and facilities available for long-haul business—business which the electric railways are not in a position to handle."

EDWIN C. FABER.

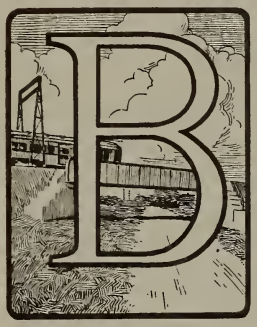
BRILL MAGAZINE

VOL. 11—NO. 10 Copyright, 1918, by The J. G. Brill Company, Philadelphia, U. S. A. MAY, 1918

EDWIN C. FABER

EDWIN C. FABER, Vice-President and General Manager of the Aurora, Elgin & Chicago Railroad and recently appointed Manager of the War Board of the American Electric Railway Association, was born in Cleveland, O., in 1876, and received his education in the Cleveland Grade and High schools, and, in 1893, entered the railway business as a clerk in the offices of the Cleveland Electric Railway. He advanced through positions of timekeeper, accountant, head of accounting department, general passenger agent and assistant to the general manager and became general superintendent at the age of 26. For many years he bore the distinction of being the youngest general superintendent of an important city railway of the United States. In 1902, the Cleveland property changed hands and its former general manager, Ira A. McCormack, became general manager of the Grand Central Terminal in New York. Mr. Faber joined him and had an important part in connection with the electrification of the New York Central Lines entering New York. At the completion of this work, which was done by the General Electric Company, Mr. Faber became the assistant to Hinsdale Parsons, Vice-President of the General Electric Company, and was occupied in making investigations and reports on the various electric railway, light and power properties in which the Company was interested until 1904, when he became general manager of the Aurora, Elgin & Chicago Railroad and Vice-President of the Elgin, Aurora & Southern Traction Company. A year later these properties were consolidated with the Cook County & Southern Traction Company and he became general manager of the combined properties which now comprise more than 170 miles of third rail and overhead electric railway out of Chicago. He was made Vice-President of the Company in 1913. In January of the present year, Mr. Faber secured leave of absence to become manager of the Traffic Bureau of the Electric Railway War Board, with headquarters in the Munsey Building, Washington, and, early in March, received the appointment of Manager of the Electric Railway War Board.

Buffalo-Niagara Falls High-Speed Line of the International Railway Company



BUFFALO and Niagara Falls, with Tonawanda and North Tonawanda midway between, have long been connected by electric railway lines of the International Railway Company which operates the railway systems of these cities and has other important urban and interurban lines in the neighboring territory. The enormous growth in population has made such a demand on the lines that it became imperative to provide an additional route, one that would not only relieve the present congestion, but would be capable of meeting future expansion. Two years ago the company commenced the construction of the long-planned double-track line and in spite of many obstacles, including unusual weather conditions and labor shortage, has brought it to completion, and it stands today one of the foremost in engineering standards, construction and equipment of the high-speed lines of the country.

The Buffalo terminus of the line is at Main Street and Lafayette Square, the center of the business district; at Niagara Falls the terminus is on the Riverway near Falls Street, also at the heavy traffic center. Between these points the distance is 22¾ miles, of which over 16½ miles is on private right-of-way. City streets are traversed in Buffalo for about 4¾ miles and 1 1-3 miles in Niagara Falls.



The line is double-tracked throughout and equipped with 420 catenary bridges

The sub-grade of the line has a top width of 29½ ft., and is ballasted with granulated slag, until it has had time to settle, when stone ballast will be used. Oak ties, spaced at 2 ft., centers, carry 85-lb. rails.

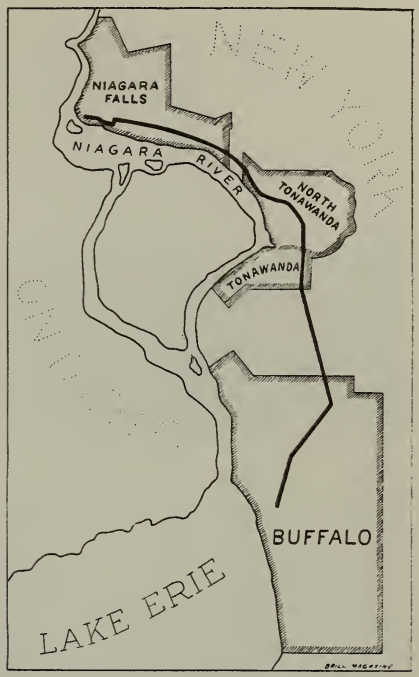
To avoid crossing at grade any other

railroad, and to cross canalized creeks in addition to nine busy streets in Tonawanda and North Tonawanda, it was necessary to build an embankment over 3½ miles long, with plate girder bridges over streets and girder and truss bridges over railroads and creeks. One of these bridges has five spans and another has an individual span of 184 ft. Approximately 2,850 tons of steel were required for the bridges.

The overhead is of catenary type supported on steel bridges spaced 200 ft. apart on tangents and varying down to 90 ft. These bridges are of four types adapted for tangents, curves, strain towers and dead-end towers, and are of unusually strong construction to permit of carrying additional transmission lines in future. There are 420 catenary bridges in all, and these total 800 tons of structural steel in their construction. The messenger wire is of 500,000-c.m. hard-drawn copper cable and is given a 3-ft. sag between supports. Hard-drawn 4/0 trolley wire is attached to the messenger at 10-ft. spaces and carries a voltage of 600.

A new sub-station at Niagara Falls and enlarged equipment in two other sub-stations provide the power supply.

Twenty cars built by The G. C. Kuhlman Car Company constitute the initial rolling stock of the line, and in plan, construction and equipment are well adapted to the requirements which include rapid acceleration and high running speed. As the accompanying diagram shows, the cars are arranged for double-end operation and have main and smoking compartments, the latter provided with sliding side doors for baggage.



Of the 22¾ miles of line, over 16½ is on private right-of-way with 3½ miles of embankment midway

The bottomframe is entirely of steel except that oak strips are bolted to the crossings to furnish an attachment for the flooring. Angle side sills, 6 by 3½ by 5/16-in., extend the full length of the side in one piece. The wide leg of the angle is placed horizontally to provide sufficient surface for riveting the crossings without the use of gussets. On each side of the steps the crossings are made up of angles in truss form. There are five I-beam crossings under the



BUFFALO NIAGARA FALLS HIGH-SPEED LINE. Types of bridges crossing highways, waterways and railways

main compartment attached to the side sills with corner angles. Pressed steel channel diaphragms, ½ in. thick, and 10 by ⅝-in. top plate and 10 by ¾-in. bottom plate, form the bolsters. Trussed crossings at each end of the car are turned to serve as end sills and as a support for the diagonal center knees.

load to the bolsters. The side sill plates are 34¾-in. wide, except those next the center door, which are 63¾-in. The belt rail and letter panel are pressed to form sash rests. Side posts of 3.56-lb. tee are alternately single and double to provide for the twin-window construction. The top plate is of 6.6-lb. angle. The



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE. Plate girder side construction with alternate single and double T-posts for twin windows. I-beam crossings and pressed steel channel diaphragm bolsters

A double flooring of 13/16-in. yellow pine and 13/16-in. white maple has building felt between. The top flooring is rabbitted for interlocking rubber tiling in the center aisle. This tiling also is used for the entire platform including the trap doors over the steps.

Each entire side of the car, together with the angle side sill, forms a girder which transmits the

vestibule posts are of tee section with dashers continuing from the side around to the cab door post. The letter panel is continued in line with the side letter panel.

The roof framing consists of an angle on each side, with the horizontal leg turned in, and 32 steel carlines to which wooden nailing strips are bolted. The carlines have a foot turned on each end and riveted to the side angle.



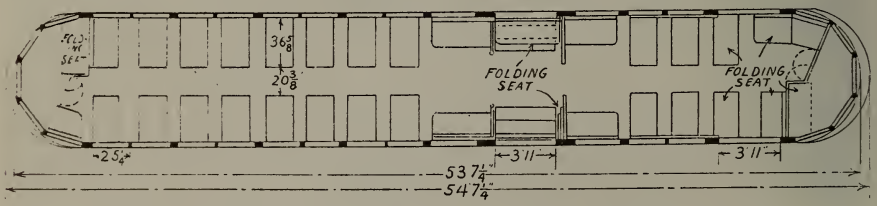
BUFFALO-NIAGARA FALLS HIGH-SPEED LINE. Twenty of these cars built by the G. C. Kuhlman Car Company constitute the initial rolling stock of the line. Mounted on Brill 27-MCB Trucks

Mahogany is employed for the interior finish, including partitions, doors, sashes, moldings and window capping. A lower side lining of sheet steel extends around the entire car and is brought up to the seat rail; the rail is of red birch and above it the lining is of composition material, painted to match the woodwork. A headlining of ¼-in. waterproof material is installed in sections extending across from the top of the curtain box and of the width of two windows.

Transverse seats with pressed steel pedestals, aisle and wall plates, mahogany arm rests, dark green upholstering and head roll, are furnished in both compartments; mahogany slat seats of the folding type are provided in the motorman's cabs and baggage section.

The center entrance doors are arranged for pneumatic operation from the conductor's position. On each side of the baggage section is a sliding door of 1¼-in. mahogany, with ¼-in. glass in the upper panels; it is hung on pressed steel tracks, with ball-bearing sheaves and slides into a pocket which is fitted on the lining side with hinged wire screens of ½-in. mesh.

Window guards of 2-in. diamond mesh wire screen, set in channel frames, are attached to the bottom of the lower side sashes and are concealed in pockets in the walls when the sashes are down.



Width over side posts, 8 ft. 6 in. Height from track to underside of side sills, 2 ft. 10⅞ in.; from track to first step, 13⅛ in.; from track to top of floor, 3 ft. 4⅜ in.; from track over trolley boards, 12 ft. 3 in. Truck centers, 32 ft. 0 in. Seating capacity (including folding seats for 13) 62



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE. The glazed partition between the main and smoking compartments and the low partition with pipe stanchions, enclose the sides of the entrance steps



The low partition with pipe stanchions separates the baggage section from the smoking compartment. Folding seats are provided which increase the seating capacity of the compartment to 20



Buffalo-Niagara Falls High-Speed Line. The sashes in the motorman's cabs are arranged to drop; the center sash has a hinged section at the center to enable the motorman to clear the glass of rain or snow

The lighting arrangement consists of six 94-watt lamps along the center of the car, five of which are in series with a selector switch to enable any to burn at one time. In addition there is an eight-light circuit of 36-watt lamps arranged to permit five to burn at one time at certain points.

Included in the equipment are roof ventilators of the Brill "Exhaust" type, illuminated signs at the top of the vestibule center sash at each end, continuous parcel racks, electric heaters, trolley retrievers, air sanders, radial couplers, anti-climbers and steel pilots.

Brill 27-MCB2 trucks, which are used under all of the cars, have a wheel base of 7 ft. and are equipped with 30-in. rolled steel wheels; they are designed for a maximum load capacity of 63,000 lb., and are capable of a speed of 60 miles per hour.

One Hundred Cars for Philadelphia Lines Serving Hog Island Ship Yards

THE Philadelphia Rapid Transit Company, through the United States Shipping Board Emergency Fleet Corporation, is increasing the transportation system serving the employees of the new ship building yards at Hog Island, on the Delaware River just below Philadelphia, by a distribution of one hundred new cars to the southern and western divisions of the city lines. This lot of cars, which is rapidly being completed at the works of The J. G. Brill Company, is of a special prepayment type, suited to single or double-unit operation by what is probably the most complete inter-car electric door control and signal system that has ever been installed

for surface car operation.

The cars are built on a bottom-frame composed of 5 by 3½ by 5/16-in. angle side sills reinforced at the bolsters with angle of the same dimensions; Z-shape end sills of 3/16-in. pressed steel, substantially gusseted to the side sills and platform knees; and crossings of ⅛-in. pressed steel, attached to the side sills by angle brackets.

In the plate girder side construction 3/32-in. steel sheets are employed, which are bolted to the posts, and riveted at the bottom to the angle sill and at the top to a 3 by ½-in. bar belt rail. Ash posts, yellow pine top plate and poplar letter panel form the upper side framing; the roof is supported on forged steel carlines, one extending above each post. The hoods are of



CARS FOR PHILADELPHIA LINES SERVING HOG ISLAND SHIP YARDS. Length over anti-climbers, 45 ft. 6 in.; length over corner posts, 33 ft. 0 in.; width over posts, 8 ft. 4 in.; height from track to step, 14⅝ in.; from step to platform, 13½ in.; from platform to floor, 10½ in.; ramp of floor, 2 in. Seating capacity, 46 Type of truck, Brill 77-E1; wheel diameter, 33 in.; wheel base, 5 ft. 9 in.; truck centers, 21 ft. 0 in.; radius of shortest curve, 35 ft. 0 in.

Cast steel bolsters with openings for the brake rods and cable conduits are bolted to the side sills. The outside knees of the platform are of 7 by 3½ by ½-in. angle, reinforced at the bottom by 2 by 2 by ⅜-in. angle; the center knees are of 5-in. channel reinforced at the bottom by 3 by 2 by ⅜-in. angle and at the top by 2 by 2 by ½-in. angle. Diagonal braces are attached to the outside knees by gussets at the crown piece, and to the end sill near the side sills.

the detachable type but are covered, together with the body, with one continuous piece of No. 8 cotton duck.

Between the aisle and the sides of the car the body flooring is laid lengthwise in two layers, ⅝-in. hard maple and 13/16-in. yellow pine, with building felt between. In the aisle the flooring is single and is covered with a mat of hard maple strips laid lengthwise. The floor is ramped at each end from the end sill to a point nearly over

the bolster, making a difference of 2 in. in height. The platform flooring also is double, the top layer being laid transversely and consisting of ¾-in. hard maple strips, 1⅞ in. wide at bottom and 1½ in. at top.

At each side of the car are 13 windows, with the upper sashes framed in a continuous piece and every alternate sash hinged at the bottom to allow the sash to open inwardly a few inches for additional ventilation. The lower sashes are arranged to raise; these sashes and those in the vestibules have brass stiles. Window guards of 2-in. mesh wire screen, set in ¼-in. pipe frames, are 20 in. wide and are in three sections to a side, each section being hinged at the bottom to facilitate window cleaning.

The vestibules have doors at both sides, four to each opening, hinged in pairs and each pair arranged to fold outwardly. They are operated by the motorman and conductor by means of electro-pneumatic mechanism, the conductor's stand at the center of the end sill being provided with a series of push buttons for the purpose and the motorman having his directly in front of his position. The push button system is arranged for inter-car operation and provides complete door control of two cars by one conductor and motorman if desired; ordinarily one motorman and two conductors comprise a two-car crew. This equipment for one car consists of four 2⅝ by 4½-in. air engines, four engine base plates and gears, two two-button push button boxes, two four-button push button boxes, one resistance for push button boxes, eight snap switches to "kill" push buttons when doors are not in service, four double-shaft door devices complete, four three-arm step door devices complete, two special conductor's control stands, four door switches mounted on engine connected to operating arm, two motorman's signal lights, one motorman's signal light resistance and two emergency key switches.

A pipe rail for enclosing the



CARS FOR PHILADELPHIA LINES SERVING HOG ISLAND SHIP YARDS. The cars are equipped with electric and air train control apparatus and a complete inter-car electro-pneumatic door control system



CARS FOR PHILADELPHIA LINES SERVING HOG ISLAND SHIP YARDS. Safety, simplicity of operation and maximum carrying capacity are the cardinal features of these cars

right side of the motorman's position, has a swivel attachment to the vestibule lining and a dovetail connection on the conductor's stand; when not used for this purpose, the rail is brought around in front of the motorman's control equipment for its protection, in which position it serves as a hand rail for incoming passengers.

Twenty-six push buttons are provided per car, the system being of the high voltage type. One push button is located on each intermediate post and one on the body corner post at diagonal corners. The motorman's signal system consists of a single stroke bell in each vestibule. A conveniently placed push button enables the motorman to signal the conductor of his intention to stop to take on passengers.

The lighting circuit has ten lights along the center of the car and one in each vestibule; two lights in the sign box in the right-hand upper sash in the vestibule at each end; and one light in each headlight. The two sign lights and the headlight alternate on circuit with the lamp directly inside the bulkhead at each end of the car. The balance of the lighting is on two five-light circuits. Automatic tail lights with green and red lenses are provided; the light with the red lens is fitted with an additional battery lamp.

Included in the equipment are

(*Continued on page 289*)

"Peter Witt" Cars for Youngstown, Ohio

BRILL "RENITENT" POST WINDOW SYSTEM

THIRTEEN cars of the "Peter Witt" type, built by the G. C. Kuhlman Car Company, were placed in operation a few months ago on the Youngstown lines of the Mahoning & Shenango Railway & Light Company to relieve the congestion on certain routes during rush-hour service, especially on the busy Park and Falls line. Youngstown is one of the large steel manufacturing centers of the country and its population has grown enormously in recent years, making heavy demands upon its transportation system. Neighboring towns, engaged chiefly in the same industry, are connected by the comprehensive network of city, suburban and interurban lines of the "Em-an-Ess," as the system is locally called.

These cars are of steel construction with the underframes composed of structural shapes. The angle side sills are each of one piece; the sill on the right side is depressed 15⅞ in. to provide for a low center exit and its sliding doors. The crossings are riveted to the side sills; double crossings serve as end sills, being powerfully reinforced at the center and ends, with steel plates of generous dimensions as they form the attachment of the inner end of the members which support the draft rigging. Bolsters of pressed steel channels, riveted to heavy top and bottom plates, are capable of carrying the weight of the car and its equipment, plus a uniformly distributed passenger load of 125 lb. per square foot, without undue deflection.



The standard framing construction of the "Peter Witt" Car combines lightness and strength

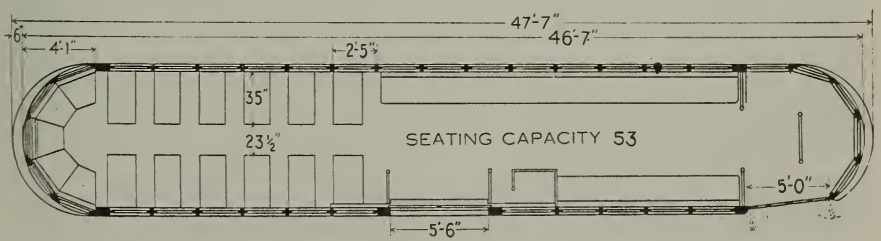
The body flooring under the seats is of yellow pine in two layers, and the aisle flooring is of one thickness covered with hard maple strips. At the front end of the car the flooring is of one-inch hard maple in 3-in. strips, laid crosswise. At the center exit, the floor is given a cross ramp of 1⅜ in., and at the front entrance it is ramped 1⅝ in.



"PETER WITT" CARS FOR YOUNGSTOWN. Thirteen front-entrance, center-exit, pay-as-you-pass cars are in service on the heavy traffic lines of this busy steel manufacturing city. Mounted on Brill 77-E1 Trucks

Side girder plates are riveted at bottom to the angle sill, and at the top to a belt rail and window sill of 1/8-in. pressed steel, and to T-posts. The steel letter panel is continuous and pressed at the bottom edge to form a capping for the upper sashes which are framed in continuous sections. Steel carlines secured to the letter panel, and arch-type bulkheads with pipe stanchions, support the plain-arch roof. Tongued and grooved poplar roof sheathing is nailed to hardwood strips which are bolted to the steel carlines.

Natural cherry of plain, sanitary design is employed for the finish of the arched bulkhead and for the doors, sashes and seats. The sides of the body are insulated with material glued to the steel panels. A wainscoting of tongued and grooved poplar is stained cherry. The headlining is of 3/16-in. composition material, painted a light buff color. The lower window sashes raise their full height and are fitted in the spring grooves of the "Renitent" post casings. A wire screen window guard is attached to the bottom of each side sash and disappears into a wall pocket when the sash is lowered. A push button is installed on each body post.



Width over side sheathing, 8 ft. 2 in. Height from track to step at front entrance, 14⅛ in.; from step to floor, 13¾ in. Step heights at center exit, respectively, 15⅞ and 13⅜ in. Seating capacity, 53



"PETER WITT" CARS FOR YOUNGSTOWN. Looking rearward from front platform. Conductor's position at center has surrounding railing equipped with handle for opening and closing pneumatically operated center-exit doors

Two single sliding doors are provided at the center exit and two two-leaf, outward-folding doors at the front entrance; they are made of 1⅛-in. cherry and have ¼-in. clear wire-glass in the lower panels. The doors at both entrance and exit are pneumatically operated and protected by interlocking control.

Six Brill transverse seats with 18-in. stationary backs and corner grab handles are placed on each side of the aisle at the rear of the car. Longitudinal seats in the forward half are open underneath and supported on legs bolted through the floor. Seats of the builder's standard types are provided for the motorman and conductor.

Illuminated signs, switch cabinet, ventilators, forced ventilation hot air car heater, vertical wheel hand brake, pneumatic sanders, trolley retriever, register operated by foot pedal, fare box, transfer box and single-stroke signal bell, are included in the equipment.

The cars are mounted on Brill 77-E1 trucks, equipped with 26-in. rolled steel wheels; they have a wheel base of 5 ft. 1½ in. and are spaced at 25-ft. centers. These trucks are designed for inside-hung motors and are capable of a speed of 40 miles per hour.

Additional Cars for Chicago Surface Lines

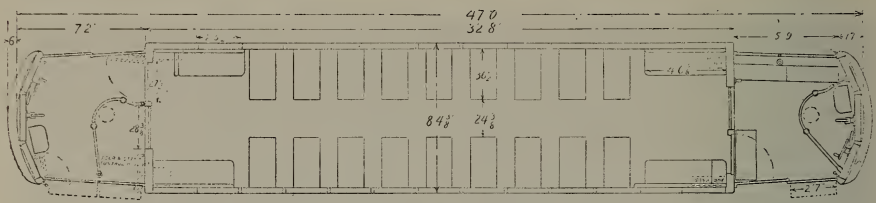
PLATE GIRDER SIDE CONSTRUCTION

THE American Car Company recently delivered to the Chicago Surface Lines ten cars of the same plan as a lot of one hundred furnished in 1914 by The J. G. Brill Company. The underframe was redesigned as the sides are of plate girder construction instead of convex and concave wooden panel type as in the former lot.

The underframe is built up of 2 by 2 by 5/16-in. angle side sills, 10-in. channel end sills and 4-in. channel crossings. It is braced at each end by 2¼ by ¼-in. bar diagonals, extending between the bolster and the corners and the bolster and the side sills at the first crossing at which point, the bars are riveted to large gusset plates; these plates also serve as the attachment for the long center diagonals. On each side of the bolster, extending to the end sill and to the first crossing, are three 3 by 1½ by ¼-in. tees. Cast steel bolsters, of I-beam section, are ribbed down under the side sills. At each end of the bolster a thick plate is bolted vertically, to which the end of the platform outside knee is secured with five ¾-in. turned bolts; the knee is attached to the end sill by two 1⅛-in. bolts. The knee construction is of plate and angles in I-beam form of dimensions to insure ample support to the 7 ft. 8-in. platforms; the method of their attachment to the end sills and bolsters enables them to be readily removed if necessary. Four-inch I-beam platform center sills are connected to the end sill by a 24 by 9 by ¼-in. plate, and to the 8-in. channel bumper by angle corner brackets. The platforms are braced by 2 by 1¼ by ¼-in. angle diagonals gusseted to the end sill and the outer end of the outside knees and connected at the center by a plate riveted to the platform center sills.



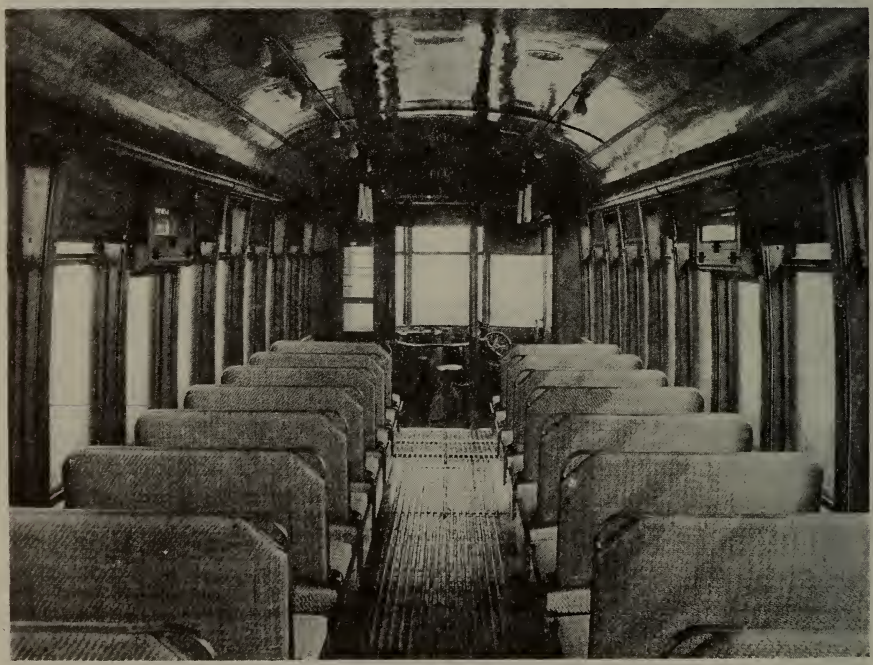
Ten of these rear-entrance, rear-and-front-exit cars were built by the American Car Company. Steel plate side girder and wood post construction



CARS FOR CHICAGO SURFACE LINES. Height from step to platform, 12¾ in ; from platform to floor, 10¼ in.: from floor to ceiling, 7 ft. 8⅜ in.; from underside of side sills over trolley boards, 8 ft. 11 1/16 in. Truck centers, 20 ft. 5 in. Seating capacity, 54

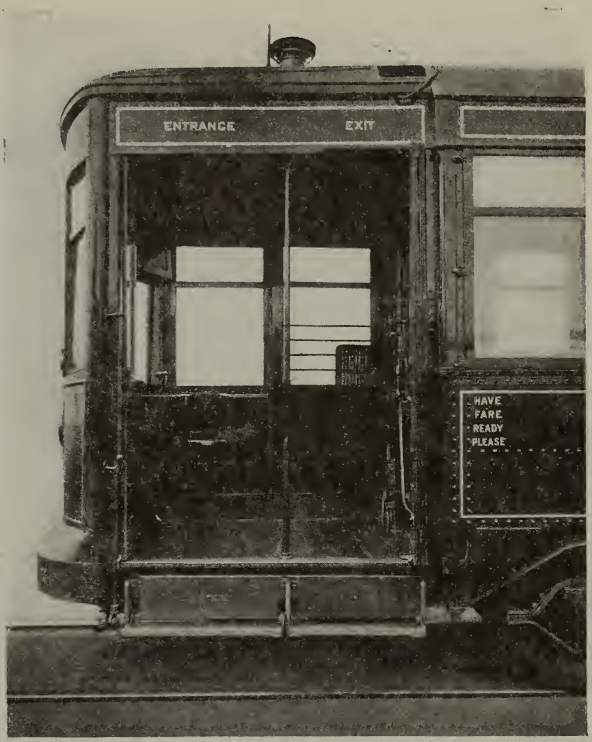
The side construction consists of 30 by 9/64-in. plates riveted at the bottom to the angle sill and at the top to a 2 by 1½ by ¼-in. angle belt rail; the seat-rest angles are of 1½ by 1½ by ⅛-in. section. Ash side posts are 2⅝ in. thick and the corner posts 5 9/16 in. Pressed steel carlines extend from the top of each post; wooden carlines, bolted to the steel carlines, serve as an attachment for the sheathing boards, trolley board cleats and ceiling moldings. An additional wooden carline is placed midway between each pair of steel carlines.

Thirteen window openings on each side of the car are fitted with stationary upper sashes of the



Stationary upper sashes are of the continuous frame type. Lower sashes raise their full height. Bulkheads fitted with swing door for entrance and sliding door for exit

continuous frame type; the lower sashes are arranged to raise to the height of the bottom rail of the upper sashes, window pockets being provided in the roof. The body and vestibule sashes have channel brass stiles and rails, and are fitted with channel rubber to hold the glass; they are protected at the bottom with a rubber buffer the full width of the sash. Storm sashes with cherry frames are provided for all side windows. Wire screen window guards, 17 in. high and made in two-window sections, are held on the outside of the posts by the railway company's standard locks.



CARS FOR CHICAGO SURFACE LINES. The 7 ft. 8 in. platforms are supported on built up I-beam, outside knees heavily bolted to end sill and bolster

Five of the cars are mounted on Brill 27-GE1 double-motor trucks and one each on Brill 27-FE1 double-motor and 39-E single-motor types.

One Hundred Cars for Philadelphia Lines Serving Hog Island Ship Yards

(*Continued from page 283*)

8 ventilators, 20 electric heaters in the body and one in each vestibule, cherry hand rails running the full length of the body, combination air and electric couplers, air sanders, vertical-wheel hand brakes, non-protruding fenders of automatic tripping type, platform gongs, trolley retrievers and emergency car jack.

All of the cars are mounted on Brill 77-E1 trucks, which have a wheel base of 5 ft. 9 in., 33-in. forged steel wheels, 4½-in. heat treated axles and 3¾ by 7-in. journals.



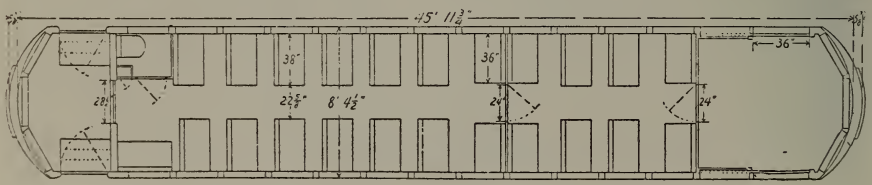
The cars are equipped for single-end control and have main, smoking and baggage compartments

Interurban Cars for the Northwestern Pennsylvania Railway

THREE-COMPARTMENT TYPE

THE Northwestern Pennsylvania Railway Company has lately added to its rolling stock three cars of the type illustrated, two 45-ft. steel express cars with trucks, and two 34 ft. 4-in. trailer box car bodies, built by the Wason Manufacturing Company. These are now in service on the company's line, running south from Erie to Meadville and west from Meadville to Linesville, traversing a fertile and populous region with numerous towns and villages along the 71½-mile route.

The passenger cars are of steel construction with underframes composed of 5 by 4 by ⅜-in. angle side sills; 6-in. I-beam center sills; 6 and 8-in. channel end sill of box form at entrance end; 6-in. channel end sill at baggage end; 3-in. channel crossings and diagonals. Six-inch channel bumpers have a 4-ft. section of 5½-in. anti-climber at the center. The center sills extend through from bumper to bumper and are spaced at 20⅜-in. centers. Gusset angles are used to connect the crossings to the center and



Height from track to underside of side sills, 3 ft. 7 in.; from track to first step, 16¼ in.; height of risers, 11½ in. Seating capacity, 30 in main compartment and 16 in smoking compartment

side sills, and forged corner-brackets secure the end sills to the center sills. The bolsters are built up of 9 by 7/8-in. plates and gray iron filler blocks. The draft plate is a heavy, ribbed casting, attached to the center sills by 3/4-in. bolts.

Steel carlines sandwiched between wooden carlines, and wooden carlines between each pair of posts, constitute the roof framing. Half-inch whitewood is used for the roof sheathing and two thicknesses of basswood for the vestibule hoods.



CARS FOR NORTHWESTERN PENNSYLVANIA RAILWAY. Interior is finished in mahogany and furnished with plush upholstered seats in the main compartment and leather in the smoker. Window sashes are single and arranged to raise

The side construction consists of 2 1/2 by 2 by 3/16-in. angle posts, two angles to each post; 3 1/2 by 3/8-in. belt rail; 1 1/2 by 3/8-in. letter panel rail; 3 1/2 by 2 1/2 by 5/16-in. angle top plate; No. 12 gage side sheathing and letter panel plates and No. 16 pier panel plates.

The trolley platform extends the full length of the roof.

The bulkheads and partition are of mahogany and are not glazed; they are provided with glazed doors. Mahogany is employed for the interior finish, including doors, sashes and window sill capping.

Twenty-four Cars for Newport News and Hampton Lines

BRILL SEMI-CONVERTIBLE TYPE

THE Newport News & Hampton Railway, Gas & Electric Company has received six cars of the type illustrated, from The J. G. Brill Company, and has ordered eighteen additional. The railway system serves Newport News and connects this important shipbuilding city and shipping port with Hampton, Langley Field, Old Point Comfort and Buckroe Beach, and is completing a line to Hilton. The fact that the population of this district has doubled in the past year and the fact that the company has met the demands of the enormously increased traffic, are remarkable instances of wartime conditions and activities.

The new cars are of wooden construction, with the underframe reinforced with side sill plates and channel end sills. The sill plate is 16½ in. wide and 5/16 in. thick, and is bolted between a 2¾ by 6⅞-in. long-leaf yellow pine side sill and a 1¾ by 5¼-in. floor sill. Ten-inch channel end sills are secured to the side sills and plates with forged corner brackets and gusset plates. The cast steel bolsters are made with openings for two I-beams spaced at 12½ in. centers and which extend from the end sill to a 3½ by 5¼-in. crossing, 4 ft. 8 in. back of the bolster; the I-beams are bolted to the bolster and bracketed to the end sill and crossing. Tie rods placed on each side of the crossings, are bent down and attached to the bottom of the member at the center.



Length over corner posts, 33 ft. 6 in.; over crown pieces, 44 ft. 11 in.; over bumpers, 46 ft. 7 in. Length of platforms, 5 ft. 8½ in. Truck centers, 21 ft. 6 in.; Side post centers, 2 ft. 6 in. Width over panels at sills, 8 ft. 2 in.; over posts at belt, 8 ft. 4 in. Height from track to step, 15¼ in.; from step to platform, 14⅝ in.; from platform to floor, 9 1/16 in. From track to underside of side sill, 2 ft. 8⅞ in.; from underside of side sill over trolley boards, 9 ft. 1 in. Mounted on Brill 76-E1 Trucks



CARS FOR NEWPORT NEWS AND HAMPTON RAILWAY. Transverse seats of the Brill "Winner" type and longitudinal corner seats furnish a seating capacity of 52. Folding seat in vestibule accommodates 4 persons

The flooring is of 13/16-in. tongued and grooved pine, set ¾ in. lower at the aisle than under the seats, and the aisle section covered with longitudinal maple strips.

Platform knees built up of channels, and I-beam spacers in open truss form, are heavily bolted to the end sills within the area of the corner reinforcement. The drawbar sills are of 5-in. channel.

The ash side and corner posts are respectively 2¼ and 4¾ in. thick. Oregon pine is used for the top rail and side panels. Steel carlines at each post reinforce the wooden carlines of the monitor type deck.

The window system is the Brill Semi-convertible type, consisting of sashes held together with brass tongued and grooved slides, the lower sash carrying the upper with it into a roof pocket. The vestibule center sash is arranged to slide to the left of the motorman; the two side sashes drop into pockets provided with hinged covers. The body ends are open and spanned by arched end plates.

Brill "Winner" seats and 4-passenger longitudinal corner seats are covered with twill-woven rattan. The transverse seats are 36 in. long, and have 18-in. backs.

Brill 76-E1 trucks are used under all the cars and have a wheel base of 4 ft. 6 in., 33-in. wheels and 3¾ by 7-in. journals.

Center-Entrance Trail Cars for Portsmouth, Ohio

BRILL 67-F TRUCKS

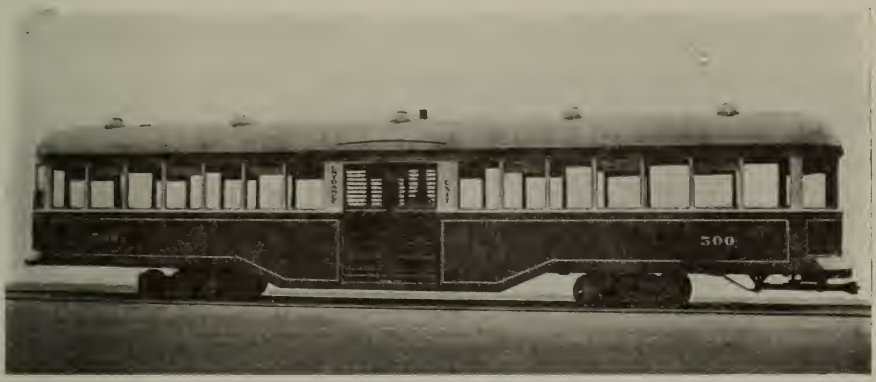
THE Portsmouth Street Railroad & Light Company has inaugurated trail car service to relieve congestion during rush-hour periods, and has adopted the Cleveland type of car with slight changes.

The cars, which were built by the G. C. Kuhlman Car Company, are of light steel construction with plate girder sides, angle side sills, channel center sills and channel truss-form crossings. The crossings are connected to the center sills with large gusset plates. The bottom angle of the step side of the frame is depressed 15 in., for a distance of 12 ft., and is reinforced at the depression by an angle braced to the center sills with angles. The door head piece is built up of angle and plate, extending the full length of the door pockets, and includes an angle continued from the door posts; these members are riveted to the steel letter panel. The door posts are built up of plate with an angle riveted to each edge.

Pneumatically operated doors



The doors, air brakes and signal system are operated from the fare box stand at the center. Metal framed sashes drop into wall pockets. A hand rail of convenient height is provided over the seats



TRAIL CARS FOR PORTSMOUTH, OHIO. The cars are similar to the latest type of Cleveland trailer. Mounted on Brill 67-F Trucks equipped with 26-in. wheels

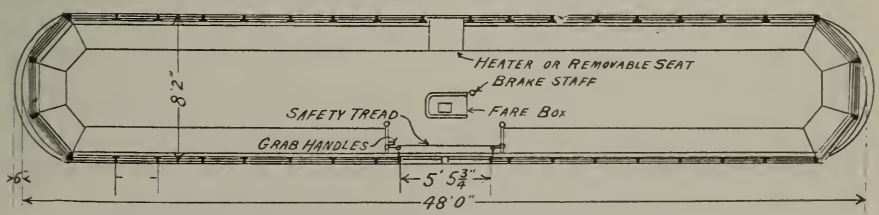
are controlled from the fare box stand. The doors are hung on ball-bearing sheaves and each door has an individual engine installed under the adjacent seat. A post divides the doorway and each door is fitted with a rubber hose buffer.

Metal framed sashes are arranged to drop into pockets between the posts, with the exception of the door pocket windows, which have a stationary outer sash and a hinged inner sash. Ten Brill "Exhaust" ventilators expel the vitiated air when the windows are closed.

Cherry is used for the interior finish, doors and other woodwork. The 1½-in. pipe stanchions and grab handles near the doors and the hand rails over the seats are enameled to correspond with the finish of the car. The seats and seat backs are made with pressed steel frames and are padded with ½-in. hair felt covered with canvas-lined, twill-woven rattan.

The signal system consists of a 5-in. gong on the front letter panel operated by a cord extending through the entire car, and a push-button installed on the money tray of the fare box which operates a buzzer in the motor car ahead; push-buttons on each post ring a bell near the conductor.

The cars are equipped with air-brakes and automatic couplings, and have an equalizing handbrake system connected to the airbrake levers and operated from a brake staff braced to the fare box.



Height from track to step, 15 7/16 in.; from step to floor, 14 in.; from track to top of floor, 29 7/16 in.; from floor to center of ceiling, 7 ft. 10½ in. Seating capacity, with heater, 59; without, 60; standing capacity, 70; total passenger capacity, 130

Steel Cars for the City Lines of Tulsa, Oklahoma

BRILL 39-E TRUCKS

THE Tulsa Street Railway Company, which operates the city lines of Tulsa, has lately added to its equipment four cars built by the American Car Company. Tulsa has had a phenomenal growth and continues to increase rapidly. Its population in 1900 was 1,390; in 1910 it was about 20,000, and today it is about 50,000. The city is in the northwestern part of Oklahoma, on an elevation on the north bank of the Arkansas River; rolling prairie extends on all sides. Six important steam railroads converge here and three electric interurban lines connect the city with cities and towns in the vicinity. It is the commercial center of a rich oil, gas and coal region, and grain, cotton and livestock are among the principal industries of the well-developed surrounding country.

The new cars are of plate girder and T-post construction, and have angle side sills of 2½ by 2½ by ¼-in. section. Z-shaped end sills are built up of plate and angles; 4-in. channel is used for the crossings, 2½ by ¼-in. bar for the diagonals between the bolster ends and the center of the end sill, and 2¼ by ¼-in. bar for the center and platform diagonals. The outside platform sills are of 7-in. channel and the center sills of 4-in. channel; they are secured to the 5-in. channel bumpers with forged corner brackets. Built-up bolsters, with 9 by ¾-in. top and bottom plates, have the top plate brought under the side sills. The side girder plates are reinforced at the bolster ends with ¼-in. plate.

Tongued and grooved 13/16-in.



The side construction is of plate girder type with T-post, angle corner post and pressed steel combination letter panel and top rail upper framing. Mounted on Brill 39-E Trucks

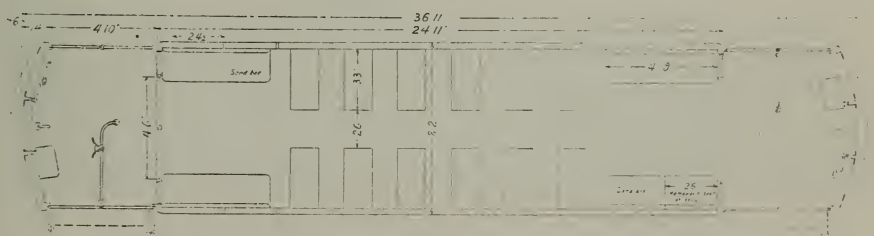
yellow pine, laid lengthwise, constitutes the body flooring. The aisle section is set lower for the purpose of covering it with mat strips. From the bolster to the end sill the floor is given a ramp of 1½ in. A maple flooring is laid crosswise on the platforms.

T-section, 1½ by 1½ by 3/16-in. side posts, and 1½ by 1½ by ¼-in. angle corner posts, extend from side sill to top plate. The letter panel is of pressed steel, the bottom edge formed into a drip rail and clamp for the continuous-frame upper sashes, and the top edge turned in at right-angle to serve as a top plate. Carlines of 1½ by ¼-in. steel have a foot bent at each end; the foot is riveted through the top plate to one leg of a corner angle, the other leg of which is riveted to the top of the T-post. Arched end plates with one-inch pipe stanchions take the place of bulkheads.

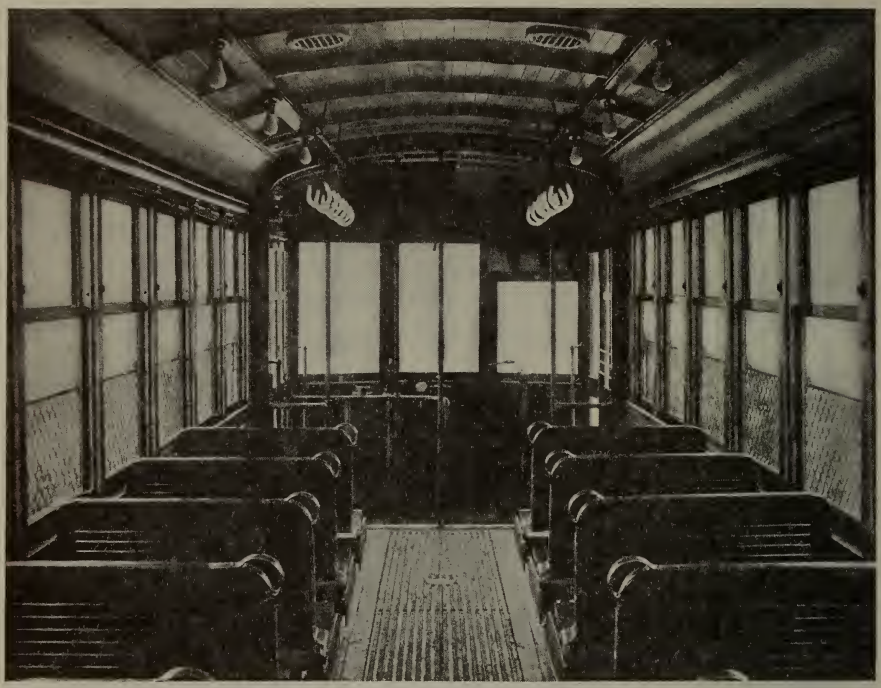


CARS FOR TULSA, OKLAHOMA. The cars are arranged for double-end operation and have manually-operated exit and entrance doors at rear and exit door at front

The two-leaf, outward-folding doors at each side of the platform are opened and closed by manually-operated mechanism. Oak



Height from track to step, 13½ in.; from step to platform, 13½ in.; from platform to floor, 10 in.; ramp of floor, 1½ in.; from track to underside of side sills, 2 ft. 8⅞ in.; from underside of sills over trolley boards, 8 ft. 1¼ in. Seating capacity, 40



CARS FOR TULSA, OKLAHOMA. Upper sashes of continuous-frame type; lower sashes raise 26 in. Brill "Winner" seats

steps, full width of the opening, fold in conjunction with the doors. The doors are hung on shaft hinges and are glazed in the lower panels with clear wire glass.

Three single sashes in the vestibule are arranged to drop into pockets formed by a lining of No. 20 sheet steel. Ten windows on each side of the car are provided with continuous-frame upper sashes painted to give the appearance of individual sashes; the lower sashes are arranged to raise 26 in.

Doors, sashes, seats and interior finish, except the lining below the window rail, are of cherry. The side lining is of composition material. Polished bronze trimmings are used throughout.

Brill "Winner" seats and longitudinal corner seats furnish a seating capacity of 40. Eight Brill "Exhaust" ventilators are spaced equal distance apart on opposite sides of the roof. Platform division rails, wire screen window guards, vestibule-window sign boxes, side-post push buttons, air sanders, air brakes, hand brakes, life guards, signal bells, alarm gongs and radial draw bars are included in the equipment.

The cars are mounted on single-motor trucks of the Brill 39-E type equipped with 21 and 33-in. wheels. The wheel base of the trucks is 4 ft. 10 in., and the bolster centers are spaced at 16 ft. 2 in.

Line-construction Car for Mississippi River Power Company

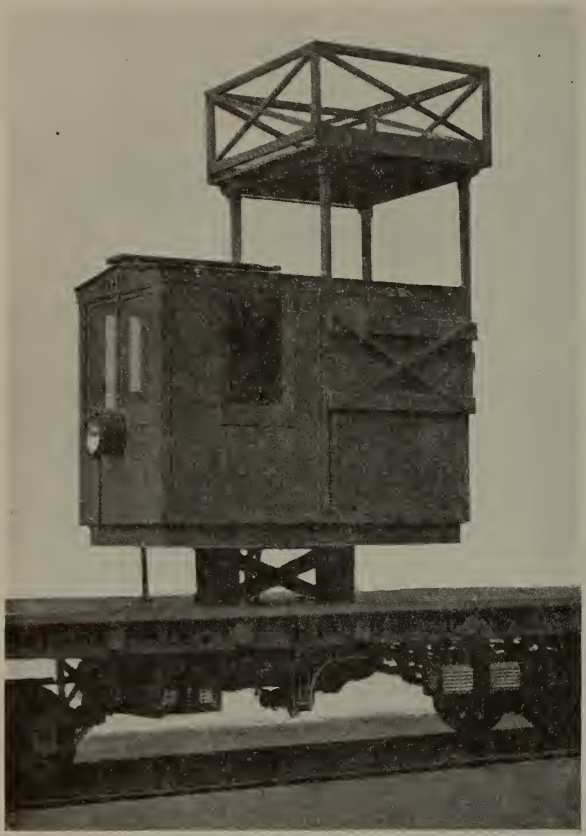
BRILL 50-E3 TRUCKS

THE useful type of line and construction car, shown in the illustrations, was designed and built for the Mississippi Power Company, of Keokuk, Iowa, by the American Car Company. As will be seen, it is simply a double-truck flat car with cab mounted on a narrow support to give extra space for rails and long material. The cab is equipped with an extension tower raised and lowered by a hand wheel located on the outside of the cab.

The car frame consists of 10-in., 30-lb. channel side sills bent around and spliced at the center of the ends with the forged double-corner bracket which connects them to the center sills; 10-in., 35-lb. I-beam center sills extend through from end sill to end sill in one piece, spaced apart at 20-in. centers; and crossings of I-beam form made up of two 8-in., 14¼-lb. channels placed together. Ten-inch, 35-lb. I-beams serve as bolsters. The bolsters and crossings are secured at all corners to the center and side sills with corner brackets. An 8-in., 16¼-lb. channel bumper with 8-in. oak filler between it and the end sill, protects the frame at each end. Cast iron stake pockets are bolted to the outside of the side sills.



Length over end sills, 39 ft. 2 in; length over all, 40 ft. 0 in.; width over sills, 8 ft. 2 in.; width over all, 9 ft. 0 in. Length of cab, 10 ft. 0 in.; width of cab, 5 ft. 0 in. Height from track to underside of side sills, 3 ft. 7 in.; from track to top of floor, 4 ft. 8 in.; from top of floor to underside of cab sills, 18 in.; from underside of cab sills to top of roof, 7 ft. 10 in. Truck centers, 24 ft. 0 in. Type of trucks, Brill 50-E3



LINE-CONSTRUCTION CAR FOR MISSISSIPPI RIVER POWER COMPANY. The tower is raised by a wire rope which is wound on a drum by a hand wheel located on end of cab

A flooring of 3-in. yellow pine, ship-lapped, is laid crosswise and bolted to the frame at all crossings. The floor is curved at the corners and the edge protected on all sides by a floor angle of 2½ by 2½ by 5/16-in. section.

The cab is located at the center of the car and is built on an underframe composed of 8-in., 11¼-lb. channels, bent around the corners and joined by splice plates at the center of the ends. From the top of the car floor to the under side of these channels is 18 in. The cab is elevated on a 12-inch-wide structure consisting of four pairs of 4 by 4 by ⅜-in. angles set upright and longitudinally braced by 3½ by ½-in. cross bars; the angles bear on the crossings of the car frame and are bracketed to the center sills.

The cab is provided with one door, glazed in the upper part, and five windows, two at each end and one opposite the door. The floor and finish are of yellow pine and the door and sashes of ash. Tongued and grooved poplar is used for the roofing and is covered with No. 8 cotton duck.

The tower has a 6-ft. square floor and is provided with collapsible sides stoutly made and strengthened with ¼-in. tie rods.

Air brakes and couplings, hand brakes, M. C. B. couplers, trolley retriever, alarm gong, headlights and regulation type of steps for car, cab and tower, are included in the equipment.

The Brill 50-E3 trucks on which the car is mounted have a carrying capacity of 88,000 lb. per pair.

Steel Auto-Omnibuses for Rio Janeiro

*STORAGE BATTERY TYPE

SEVEN auto-omnibus bodies, built by The J. G. Brill Company and recently shipped to the Rio Janeiro Traction, Light & Power Company, are of all-steel construction and of novel type, resembling, as the illustrations show, a modern street railway car. They were ordered by the Pearson Engineering Company for auxiliary service in connection with its traction property in Rio Janeiro and are admirably planned to suit the climate and the street and boulevard traffic requirements of the Brazilian metropolis.

The side and underframe construction is similar to that of a single-truck trolley car, except it is planned for the narrower support provided by an automobile chassis. Three-inch channels are employed for the eight body frame crossings and are secured to the channel frame of the chassis with angle brackets. Angle side sills rest directly on the ends of the straight crossings and are attached thereto by angle gusset plates. Channel end sills, of the same dimensions as the crossings, are substantially gusseted to the side sill angles. At the front end, the chassis frame is extended to support the flush platforms; the rear platform is of the drop type and supported on knees secured by plates to the chassis frame.

A tongued and grooved yellow pine flooring is laid lengthwise in the body and front platform and crosswise on the rear platform. A section of the front platform floor in front of the driver's seat is set



Seven buses built by The J. G. Brill Company for the Rio Janeiro Traction, Light & Power Company resemble a single-truck trolley car in construction, appearance and carrying capacity

* See article in Electrical World, June 1, 1918, describing chassis, battery and tests

3 in. lower to accommodate the steering gear.

The lower side construction is composed of a steel plate riveted at bottom to the side sill angle, at top to a flat steel bar and stagger-riveted to T-posts and pressed-steel, box-type corner posts. In

upper part and without door, is built into the front end of the body; the rear end has an arched end plate and pipe stanchions. The vestibule posts are of pressed steel; the lower front construction is a continuation of the side. The rear platform has the same type of



Auto-Omnibuses for Rio Janeiro. The mild climate of Rio Janeiro permits curtains to be substituted for doors and sashes. Sashes are provided in the front vestibule and bulkhead

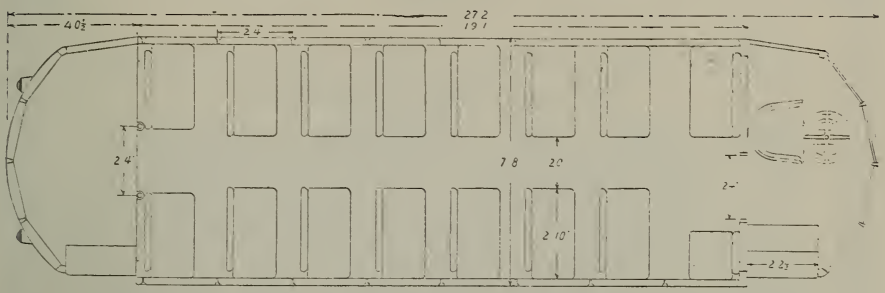
place of a letter panel, a steel panel forms a one-piece frame for four half-oval sections of opalescent glass and is secured to the outside of the posts. An angle top plate extends from corner post to corner post and is riveted to the side posts, pressed steel rafters and sheet steel roof.

A steel bulkhead, glazed in the

posts and sheathing, except that the sheathing is deeper on account of the drop platform.

The steps are of the built-in steel hanger and riser type, designed to come within the side line of the body. They are double at front platform, single at rear, and are fitted with safety treads.

Weather-proof curtains, pro-



AUTO-OMNIBUSES FOR RIO JANERIO. Height from pavement to platform step at rear, 15 7/16 in.; from step to platform, 14½ in.; from platform to floor, 12 in. Height from pavement to first step at front platform, 14 1/8 in.; risers, 13½ in. Height from pavement to underside of side sills, 3 ft. 3 1/16 in.; from underside of side sills to top of roof, 4 ft. 1 in.; from underside of side sills to top of belt rail, 17 in.; height of side openings, 3 ft. 0 in.; from floor to ceiling, 6 ft. 11 in. Seating capacity, 32

tected at the edges by the deep grooves in which the fixtures slide, extend to the floor line and serve instead of doors. The side and rear platform window openings have curtains instead of sashes; sashes are only provided in the front vestibule and bulkhead. The vestibule sashes are double and of equal size, the lower sash stationary and the upper arranged to drop; the bulkhead sashes drop into pockets. All sashes have wood rails and brass stiles.

No lining is provided for the sides, platforms and roof, except at the sides of the latter to furnish a backing for advertising cards. As the sides are but 15 in. from top to floor, the window openings are guarded by wire screens, made in two sections to a side, and by two rods spaced 3 in. apart above the screens.

Stationary back seats of Brill manufacture have pressed steel pedestal with integral extension for back support, pressed steel wall plate and back support, corner grab handle, twill-woven rattan covering for cushion and back and spring cushion. All seats face forward, except a double and a single seat which back against the bulkhead. The driver is furnished with a single-pedestal, spring-cushion seat covered with rattan.

The lighting arrangement consists of four lamps on each side of the ceiling enclosed in brass-framed, hemispherical globes attached to the rafters. Two electric headlights fitted with 5½-in. diameter lens, and two tail lights with 3-in. lens, are enclosed in cylindrical steel casings riveted to the platform sheathing at each side. Illuminated signs with 12-name roller curtains are placed transversely at each end of the roof. The lighting circuit is in conduit and the current taken from batteries on the chassis; the voltage is 100. Switch panel, ampere hour meter and circuit breaker are located at the left of the driver.

Provision is made for ventilating the dome of the body by an installation of four roof ventilators, an adaptation of the Brill "Exhaust" type.

Motor and Trailer Trucks for Cambridge Subway Service, Boston

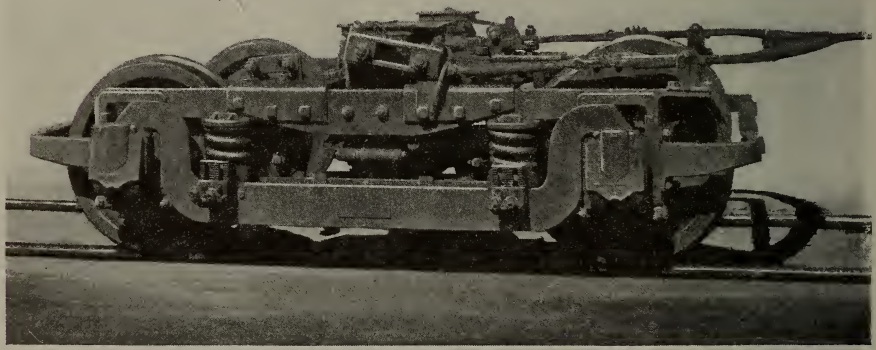
BRILL 27-MCB TYPE

THE Boston Elevated Railway Company has placed in service on its Cambridge Subway Lines thirty-five Brill 27-M.C.B.3 trucks equipped with motors and thirty-five 27-M.C.B.2 trucks for trailer operation. The steel passenger cars mounted on these trucks weigh, when empty, approximately 52,000 lb., and with maximum load, approximately 92,000 lb.

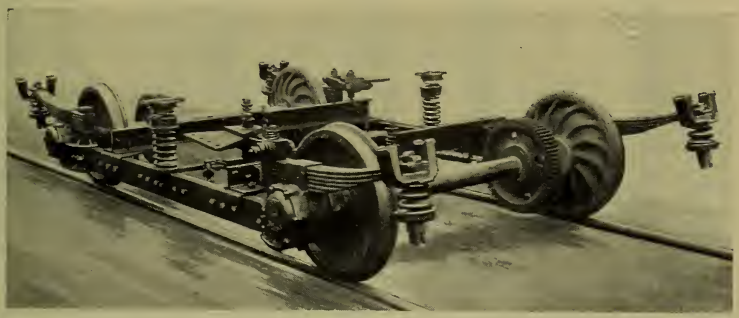
The motor trucks are equipped with outside radial brake lever and are arranged with clearance to operate on curves of 120-ft. radius.

The motor trucks weigh 13,000 lb., including wheels, axles and gears, and are equipped with 200-h. p. motors and 34-in. rolled steel wheels. The wheel base is 7 ft. 0 in.; diameter of axles, 6½ in.; size of journals, 5 by 9 in.; centers of journal bearings, 6 ft. 5 in.

The trailer trucks weigh 9,900 lb., including wheels and axles, and are equipped with 31-in. rolled steel wheels. Wheel base, 6 ft. 0 in.; diameter of axles, 5⅛ in. at center and 6⅛ in. at wheel seat; size of journals, 4¼ by 8 in.; center to center of journal bearings, 6 ft. 2½ in.



Both motor and trailer trucks are of Brill Standard construction and include among the distinctive Brill features, solid forged side frames, graduated spring system, bolster guides, side swing dampeners, "Hall-ball" brake hangers and oil-retaining center plates



TRUCK FOR LIGHT-WEIGHT CARS

AS the standard truck for Safety Cars, the 78-M is given a wheel base of 8 feet, equipped with 24-inch wheels and weighs with wheels and axles, only 3300 lb. Its remarkably smooth and steady motion at all speeds results from directly combining the action of quarter-elliptic and spiral end springs and flexibly connecting them to the car body.

Write for Bulletin 234

THE J. G. BRILL COMPANY

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AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS
Cable Address: "Bogibril," Paris

Agencies

AUSTRALASIA—Noyes Brothers, Melbourne, Sidney, Dunedin, Brisbane, Perth

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No. 158, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal

RAILWAY COMPANIES WHICH HAVE GONE IN FOR

BIRNEY SAFETY CARS

BUILT BY THE AMERICAN CAR COMPANY

ARIZONA:	Douglas Traction & Light Company.
ARKANSAS:	Hot Springs Street Railway Company.
CALIFORNIA:	Northern Electric Company, Chico. Glendale & Montrose Railway. Pacific Gas & Electric Company, Sacramento. Southern Pacifico Company, Los Angeles.
COLORADO:	Colorado Springs & Interurban Railway Company.
FLORIDA:	Tampa Electric Company.
GEORGIA:	Columbus Railroad Company.
ILLINOIS:	Centralia Traction Company. East St. Louis Electric Railway Company.
INDIANA:	Louisville & Southern Indiana Traction Company, New Albany.
IOWA:	Cedar Rapids & Marion City Railway Company. Keokuk Electric Company. Mason City & Clear Lake Railroad Company.
MAINE:	Bangor Railway & Electric Company.
MASSACHUSETTS:	Boston Elevated Railway Company. Bay State Street Railway Company, Lowell. Concord, Maynard & Hudson Street Railway Company. Middlesex & Boston Street Railway Company. Brockton & Plymouth Street Railway Company.
MICHIGAN:	Ironwood & Bessemer Railway & Light Company.
MISSISSIPPI:	Vicksburg Light & Traction Company.
MISSOURI:	Springfield Traction Company. St. Joseph Railway, Light, Heat & Power Company.
NEBRASKA:	Omaha, Lincoln & Beatrice Railway Company.
NEW HAMPSHIRE:	Laconia Street Railway Company.
NEW YORK:	Peekskill Lighting & Railroad Company.
NORTH CAROLINA:	North Carolina Public Service Company, Greensboro.
OKLAHOMA:	Pittsburgh County Railway Company, McAlester. Oklahoma Railway Company, Oklahoma City. Tulsa Street Railway Company.
OHIO:	The Cleveland, Southwestern & Columbus Railway Co., Elyria.
OREGON:	Pacific Power & Light Company, Astoria.
PENNSYLVANIA:	Coatesville Trolley Company. Northwestern Pennsylvania Railway Company, Meadville.
RHODE ISLAND:	Newport & Providence Railway Company.
TEXAS:	Dallas Consolidated Electric Street Railway Company. El Paso Electric Railway Company. Northern Texas Traction Company, Fort Worth. Houston Electric Company. Wichita Falls Traction Company.
UTAH:	Utah-Idaho Central Railroad Company, Ogden.
WASHINGTON:	Gray's Harbor Railway & Light Company, Aberdeen. Puget Sound Traction, Light & Power Company, Bellingham. Puget Sound International Railway & Power Company, Everett. Puget Sound Traction, Light & Power Company, Seattle. Tacoma Railway & Power Company.
WISCONSIN:	Madison Railways Company.
NOVA SCOTIA:	Cape Breton Electric Company, Limited, Sydney.

Statement will be made later of destinations of Safety Cars ordered by the following:
Stone & Webster, Boston.
St. Louis Rail & Equipment Company, St. Louis.
American Trading Company, Mexico City.

See article "The Standardized Safety Car" in February issue of "Brill Magazine."

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BRILL MAGAZINE

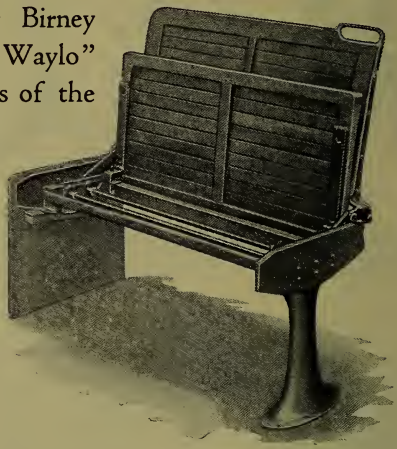


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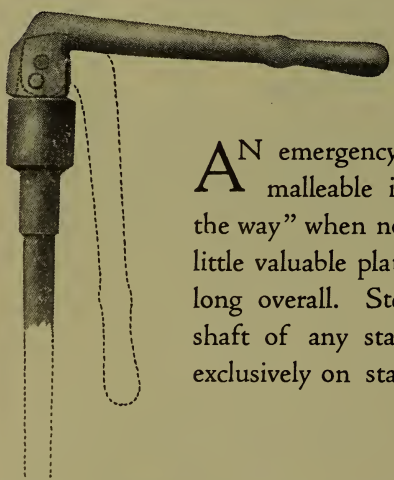
Birney Safety Car,
Brooklyn Bridge

BRILL "WAYLO" SEAT

AS the standard seat for Birney Safety Cars the Brill "Waylo" measures up to the other parts of the equipment in up-to-dateness. In the first place its construction is simple, and it consequently weighs but 30 lbs. complete. The cushion raises in "opera chair" fashion and facilitates the quick exit of passengers with the least inconvenience.

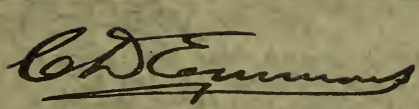


BRILL RATCHET DROP BRAKE HANDLE



AN emergency ratchet brake handle of malleable iron, which drops "out of the way" when not in use and occupies very little valuable platform space. Is 16 inches long overall. Steel stub can be welded to shaft of any standard type brake. Used exclusively on standard Birney Safety Cars.





President, United Railways and Electric Company
Baltimore, Md.

Success is the ultimate achievement of those who hold fast to its vision without slackening their efforts or losing heart.

Eventually reaching the top is but the result of continuous striving for the next highest rung on the ladder of success —and overcoming its problems.

Appreciating the value of cooperation and developing its spirit by practice as well as precept will create efficiency —and success.

BRILL MAGAZINE

VOL. 11—NO. 11 Copyright, 1920, by The J. G. Brill Company, Philadelphia, U. S. A. JUNE 15, 1920

C. D. EMMONS

CHARLES D. EMMONS, President, United Railways & Electric Company, Baltimore, Md., was born in La Fayette, Ind., in 1871. Most of his early life was spent in Pittsburgh, Pa., where he graduated from the Western University of Pennsylvania (now the University of Pittsburgh) with the degree of Civil Engineer. He then entered the employ of the Pennsylvania Railroad as rodman and advanced to be Supervisor of Signals for the territory of Philadelphia.

Mr. Emmons' first connection with the electric railway industry was in 1900 when he returned to the city of his birth and became Superintendent of the La Fayette Street Railway. In 1903, he moved to Fort Wayne, Ind., where he became General Superintendent of the Fort Wayne & Wabash Valley Trac. Co. and Superintendent of Construction of the Ohio and Indiana Construction Co., then engaged in building the Fort Wayne, Van Wert & Lima Railway. He also was in charge of the construction of a link between Fort Wayne and Bluffton, which connects with the Indiana Union Traction Company's system, and also from Logansport to La Fayette, Ind. He was appointed General Manager of the Fort Wayne and Wabash Traction Company in 1905, which position he held until May, 1911, when he resigned and became General Manager of the Chicago, South Bend and Northern Indiana Railways and the Southern Michigan Railway. On July 1, 1916, Mr. Emmons resigned to accept the Second Vice-Presidency and General Managership of the Boston & Worcester Street Railway, Framingham, Mass., and in November, 1918, he was appointed General Manager of the Boston Elevated Railway.

He was elected to his present position at a meeting of the Board of Directors of the United Railways & Electric Company on July 23, 1919.

Mr. Emmons has always been deeply interested in the various associations of the electric railway industry. When in the Middle West he was active in the C. E. R. A. and since has been prominent in the work of the American Electric Railway Association and New England Street Railway Club.

Birney Safety Car's Performance is its Best Recommendation

AFTER all is said and done, there is but one satisfactory basis on which to form an opinion on what the Birney Safety Car really means to a transportation company. And that is its *performance*—results of actual operation—increased revenue, reduced expenses, including power and maintenance, and reduced accidents with the attendant financial saving. Almost 4 years have elapsed since this little car made its first appearance in the United States, and during that time, one by one, operating companies after seeing the advantage of its operation have adopted it, so that at the present time over 140 companies have it in service or are awaiting receipt of their new cars. Every detail of its construction which was adopted as standard for the first car built is the same today as then and has been on every order turned out from any of our plants.

Recently the first two orders were received for ocean shipment, for Parana, Argentine and Pelotas, Brazil, South America, and with the construction so arranged that the cars can be dismantled in sections, boxed, and so shipped it makes it possible for any operating tramway company in the world to take advantage of the revenue producing and otherwise successful operating features of the Birney Safety Car. Parana and Pelotas should be the forerunners of many other successful South American installations.

TERRE HAUTE AN EXCELLENT EXAMPLE

Because this progressive Indiana city has made their car service 100 per cent. Birney Safety Cars, and because, as one of its newspapers said, the service has been changed from "one of the worst to one of the best," Terre Haute can be looked upon as a city to which Birney Safety Cars appealed to out of necessity and only to their success can be attributed the fact that it is the only type in operation on the streets of Terre Haute today.

Immediately after the first batch of cars were placed in service, a leading newspaper, the *Terre Haute Star,* made a very unfavorable report on them under the heading "Traction Toy Cars Fail to Serve Public," and going on to say, "The Traction Company's new toy cars have had a good tryout and the general verdict reached by the car patronizing public is that they are about the 'worst ever.' In only one respect have they fulfilled what was promised of them—they undoubtedly are new." That was in their issue of December 21, 1918. That same newspaper in their issue of February 1, 1920, a little over a year later, came out with the following favorable expression, "From a small number of old style



Terre Haute, Indiana, has 100 per cent. Birney Safety Cars in operation

cars, many of them out of repair, because no one of them could be spared from service long enough for an over-hauling, to a fleet of more than 60, 56 of which are brand new and of the latest design—from one of the poorest street car services in the country to one of the very best has been the experience of this system, much to the satisfaction of the citizens of Terre Haute."

The enthusiasm for the Birney Safety Car in Terre Haute has also spread to the Mayor of the city. He sent the following telegram to the Mayor of another city seeking information:

"We are operating fifty-six one-man cars, expect to have more; they give absolute satisfaction to the public in general; city administration is well pleased with results of one-man cars and the good service they are rendering; we feel they are giving almost entire 100 per cent. efficiency."

CHARLES HUNTER, *Mayor.*

Mr. E. M. Walker, General Manager of the Terre Haute Division, Terre Haute, Indianapolis & Eastern Traction's Lines, the operating company, has written many interesting magazine articles and his statements in connection with Terre Haute's success with Birney Safety Cars have been given wide publicity. A few months ago Mr. Walker stated to one newspaper that as far as their

revenue is concerned "this January is the best January we have ever had," showing that Birney Safety Cars have not only improved service, but that the railway company has profited through the increased popularity of their service.

Any doubt which existed, that the light weight of the Birney Safety Car would be detrimental to the life of the construction, is dispelled by the experience on the Terre Haute Lines. Car No. 474, illustrated on this page, was placed in service December 11, 1918, run over 50,000 miles in regular service, carrying more than 250,000 passengers and was out of the paint shop ready for service again on February 24, 1920, looking just like new.

SUBURBAN OPERATION

That the Birney Safety Car cannot be limited to any particular class of service, but that it satisfactorily meets conditions in business districts, where traffic is congested and demands great, or outlying sections where travel is light and in suburban service is well established. Many suburban companies have adopted the car and are receiving the many benefits accruing from its operation. The Philadelphia Rapid Transit Company on its Folsom Division, Trenton, Bristol & Philadelphia Traction Company and the Morris County Traction Company, Morristown, New Jersey, stand forth as notable examples. The latter company has 14 cars built by our Wason plant and from the following communication some idea of the results of the operation is obtained:

THE MORRIS COUNTY TRACTION COMPANY
Morristown, New Jersey

May 6, 1920.

Referring to yours of April 24th, I have just been going over some figures taken from our records as to the safety cars in operation for the month of April.

On two of our branches, we in one case increased the service 100 per cent. and in the other 60 per cent., resulting in an increase in revenue of 55 per cent.



After carrying 250,000 passengers and operating 50,000 miles in one year's regular service, this Birney Safety Car in Terre Haute is just out of the paint shop looking like new



Tampa, Florida. One of many Stone & Webster properties operating Birney Safety Cars

On a portion of our main line, where we have been giving a half-hour service, we added two safety cars, giving a quarter-hour service. This extra service carried 37,595 passengers without in any way effecting our main line service. Not having had a service in this section previously, we have no reports to compare with. However, the passengers carried are approximately the number that we ascertained were carried by jitneys. Since the introduction of the safety cars, the jitneys have ceased operation.

On the two first mentioned branches, we have found our passenger increase is 35 per cent.; our mileage increase, 80 per cent.; our car hours, 56 per cent., and our operating cost decreased 40 per cent.

These results exceed our estimate at the time we considered the purchase of the safety cars.

I might add that we have only placed six of the cars in regular operation, because we have some maintenance work to do before placing the other four, which we hope to do at a very early date and if it is desired, we will be pleased to furnish you further data, as we feel that the operations during April were somewhat influenced by the strike which prevailed in the early part of the month and also the fact that we increased our rates from 6 cents to 7 cents.

Yours very truly,

(Sgd.) O. G. SCHULTZ,
Secretary and Treas.

SAFETY FIGURES

The following Safety report was received from the Gary Street Railway Company, Gary, Indiana, and shows a very interesting comparison between the Birney Safety Car and double-truck car operation:

ACCIDENT DATA

Gary Street Railway Company

(Showing operation of one-man and two-man cars for the period of February 2, 1919, to February 3, 1920, inclusive)

TOTAL MILEAGE

One-man car for the above named period	488,722 Car Miles
Two-man car for the above named period	1,087,913 Car Miles

NUMBER OF ACCIDENTS AND CLASSIFICATION

	One-man	Two-man
Collision with pedestrians	6	6
Collision with cars this Company	7	12
Collision with cars other Companies	1	8
Collision with animals	0	4
Collision with automobiles	77	104
Collision with other vehicles	11	12

	One-man	Two-man
Derailments	1	3
Boarding cars	0	3
Passengers on cars	0	3
Alighting from cars	1	22
Split switch	2	4
Falling from cars	0	4
Ejection or dispute	1	7
Equipment	0	5
Miscellaneous	7	20
Total	114	220

ACCIDENTS TO PASSENGERS COMPARED ON PASSENGERS HAULED BASIS

(This includes accidents to passengers in collisions, equipment, derailment, etc.)

Total passengers hauled by one-man car during period.	2,281,539
Total passengers hauled by two-man car during period.	7,224,876
Number of passengers having accidents on one-man car...	9
Number of passengers having accidents on two-man car...	151

ONE-MAN CAR

One accident occurred to every 253,504 passengers hauled.

One-man car carried 24 per cent. total passengers with 5 per cent. of the total number of personal injuries to passengers.

One accident occurred to each 11 per cent. of passengers hauled.

TWO-MAN CAR

One accident occurred to every 47,846 passengers hauled.

Two-man car carried 76 per cent. total passengers with 95 per cent. of the total number of personal injuries to passengers.

One accident occurred to each 6 per cent. passengers hauled.

This report does not include accidents near cars or to employees.

SUMMARY

A few points as suggested by the foregoing report that are in favor of the one-man in relation to accident prevention:

The safety accorded passengers.

Elimination of step accidents.

Collisions with automobiles are not of such a serious nature. The light build of the one-man car does not cause as heavy an impact.

More responsibility is required by the operator, consequently he is "Keyed up" and must be more alert.

This undivided responsibility calls for less disputes and arguments. The operator has not the time.

Collisions with vehicles are brought to a minimum by the promptness and ease with which the one-man car is operated.

Modern equipment has eliminated accidents occurring through equipment.

The injuries to passengers taken in this report are such that would merit medical attendance or first aid.

After sending in the foregoing, Mr. Charles W. Chase, President of the Gary Lines, wrote us that:

"I would say that the accident record of our Safety Cars during the year is more favorable than the number of accidents would indicate. The operation of our Safety Cars is confined entirely to two streets, Broadway and Fifth Avenue, in Gary. These streets are the main business and traffic streets of the city and carry easily more traffic than all of the other streets in the city put together.

"On the other hand, the mileage of our two-men cars is for considerably more than half of their mileage operated upon track which is interurban and practically a private right of way in nature, or upon streets upon which there is very little vehicular or pedestrian traffic. Therefore, the Safety Car is exposed to far greater possibility of accident occurrence than the two-man car, and in view of this condition the record of accidents is to me very gratifying in support of the argument that the Safety Car is what its name implies. Of course the classification of accidents shows that the Safety features in prevention of accidents to passengers have produced results that are all that could be desired. I have no doubt that our future operation will be even more satisfactory than the past year."

FURTHER COMMENDATION

When the Mayor of the city of Nashville, Tennessee, sent out telegrams a few months ago to the Mayors of several cities where Birney Safety Cars had been in service, he received many interesting replies by telegraph, several of which we are reprinting in this



Birney Safety Car on suburban line outside of Philadelphia

article. They indicate more than anything else the general approval with which the operation of these cars is meeting throughout the United States.

TACOMA, WASH.

One-man street cars proven satisfactory, both with public and operators; they give better service than larger cars, with quicker pick-up of speed and more assurance of safety. Fifty-seven cars in service here; cannot predict company's future purchase.

C. M. RIDDELL, *Mayor.*

TAMPA, FLA.

Thirty-nine one-man cars now in service here and eight more ordered. Company states more will be purchased as factory is able to fill orders. Master mechanic states operatives pleased with cars, and, in my judgment, public satisfied. Company seems able to maintain schedules with these cars better than with heavier types.

D. B. MCKAY, *Mayor.*

LOS ANGELES, CAL.

About eighteen safety cars operating satisfactorily in Los Angeles and vicinity. Cars meet with favor both of the public and car operators. Forty-five additional one-man cars to be installed promptly, with more in the future. Mayor Snyder requests me to reply to your query to him.

H. Z. OSBORNE, JR.,
Chief Engr. Board of Utilities.

EL PASO, TEXAS.

One-man safety cars highly satisfactory. Public and operators both pleased with them. We operate twenty Birney cars and fourteen safety cars were built. Expect to install ten or fifteen additional Birney cars this year.

EL PASO ELECTRIC CO.

BRIDGEPORT, CONN.

Thirty one-man cars now are operating in Bridgeport and ten or twelve more will be placed in operation within two weeks. We consider these cars an improvement over old style. They make



Single End Type Safety Car in Quincy, Illinois. Another 100 per cent. installation



The celebrated Brooklyn Bridge, and incidentally a Birney Safety Car

quick get-away, being light, thus improving schedules when public learn to have exact fare ready on entering. Their quick operating will be further accelerated. Requiring only one man to a car makes possible for company to run more cars on a quicker schedule.

CLIFFORD B. WILSON, *Mayor.*

SEATTLE, WASH.

One-man safety cars proving very satisfactory. Public and car operators well pleased. We are operating seventy-four at present, some single and some double truck, and are gradually increasing numbers.

THOMAS F. MYRPHINE,
Supt. Public Utilities.

SPRINGFIELD, MO.

Half the cars operated here now are one-man cars and they are satisfactory. More of them are ordered by the company. The attitude of the public is good. Operators did not like cars at first, but do now. Their operation shows a decrease in accidents over the old cars.

CHAMBER OF COMMERCE.

HOUSTON, TEXAS.

One-man cars very satisfactory to public and operators alike. There are now forty-five in operation in Houston and company is preparing to install more. Attempt made to convert old double-truck cars to one-man type a failure. All new one-man cars working fine.

A. E. AMERMAN, *Mayor.*

BROOKLYN, N. Y.

Replying to your telegram of February 20th, we are informed by Brooklyn Rapid Transit Co. that one-man safety cars are entirely satisfactory from point of Public Transit Co. and car operators. Have one hundred and fifty-nine in operation now on twenty-three lines. Will have in few weeks total of two hundred and six cars, operated on thirty-four lines. Operators are paid five cents more per hour on safety cars than on two-man cars. Should not be obliged to carry over fifty passengers on complaint from public.

BROOKLYN CHAMBER OF COMMERCE,
Norman Thirkield, *Asst. Secy.*

OIL CITY, PA.

The General Manager of the Citizens' Traction Company, Oil City, Pa., received the following communication from the Executive Secretary of the Franklin Board of Trade:



Birney Safety Car leaving New York on its trip across the Bridge into Brooklyn

BOARD OF TRADE

FRANKLIN, PA.

DEAR SIR:

It was with great pleasure that I rode in one of the new Birney Safety Cars the other day. I confess that I had had some doubts about the practical working of one-man cars, but I am thoroughly converted to the manifold advantages of it now.

The men with whom I talked among your operating force are enthusiastic about its advantages to the operator and the safety devices are really wonderful. The fact that the car cannot start until the door is completely closed is a splendid safeguard.

The cars are more like a sitting room than what we had thought of in surface cars, and it is a positive pleasure to ride in them; one doesn't want the trip to end. I am delighted that you planned to use these cars in Franklin and know that the people here will be highly pleased with them. Don't even consider the possibility of changing your plans, for FRANKLIN MUST HAVE THESE CARS.

Very truly yours,

(Signed) B. C. EVERINGHAM,
Executive Secretary.



Brooklyn, N. Y., placed 200 Birney Safety Cars in service after a thorough test

CONSTRUCTED FOR EXPORT

With few exceptions the operation of the Birney Safety Car has been confined to the United States. It was the peculiar electric railway situation in this country which was responsible for its design and development, the rapidly increasing number of jitneys, with their unfair competition and the rising cost of operation, labor and materials, due to the war, being the most important of the many difficulties confronting the electric street railways and



One of Brooklyn's 200 Safety Cars mounted on present standard truck

which made the situation so unpromising. It might be said that this light-weight car was specially designed for domestic use only, without any consideration whatever of export shipment.

But there is no reason why the advantages of the Birney Safety Car should not be shared with tramways elsewhere. Simply constructing this car with the side posts and car-lines separate permit taking it apart and boxing for ocean shipment.

Up to the present time the success of this car has appealed to the operation of several South American tramways in Brazil, Colombia and Argentine. After these cars are placed in operation it will be possible for many in these countries to see for themselves what the Birney Safety Car is and how with it they can give better service, increase their revenue and reduce their operating expenses.

The Birney Safety Car is not a "Cure-All" for all transportation problems, but it is a standardized car which can be profitably operated and at the same time be popular with the car operators, the tramway managements and the traveling public.

Every detail of the Birney Safety Car and its equipment of motors, control, seats, etc., was designed to obtain the lightest complete unit as would give the greatest economy and adequately meet service conditions.

More Double-Deck Cars for Cape Town, South Africa

CLOSED UPPER DECK

THE Cape Town Tramway Companies, South Africa, will shortly receive a consignment of twelve (12) Double-deck Cars, which were recently shipped from the Philadelphia Plant of The J. G. Brill Company. These cars in most respects are identical in design and construction to eight cars furnished the same company several years ago, and which were described in the December, 1913, issue of BRILL MAGAZINE.

Possibly the most important difference between this and the previous order is the enclosed upper deck and the double window arrangement. In the former order eight single windows on each side with double sash enclosed the lower deck, but the upper deck was open on both sides with canvas drop curtains for protection against stormy weather. The new cars just shipped are constructed with six double windows with a double sash arrangement on each side of both upper and lower decks, which



DOUBLE-DECK CARS FOR CAPE TOWN. Almost identical to previous order, enclosed upper deck and double window arrangement being most important differences. Mounted on Brill 22-E Trucks

gives an entirely closed car. In each window each lower sash is opened by sliding it across the other, while in the previous order the single lower sash dropped into side pockets. The single upper sash in each case swings inwardly, being hinged on one end, and can be adjusted to regulate the ventilation of the car.

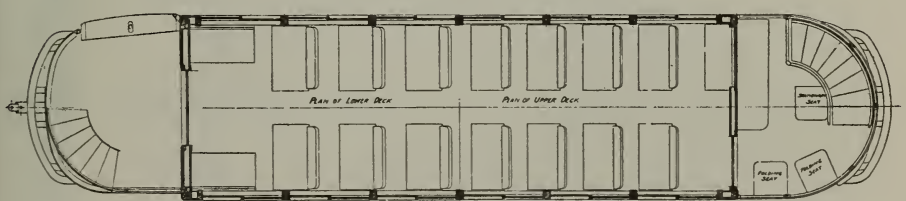


DOUBLE-DECK CARS FOR CAPE TOWN. Lower deck. Each lower sash is opened by sliding across the other. Single upper sash, hinged at one end, can be opened to regulate ventilation

As in all cars built for ocean transportation these double-deck cars were constructed as if for domestic service, taken apart in sections, boxed, and marked in such a manner as to facilitate their quick reassembly upon arrival at destination.

The underframing, which is principally of wood, includes yellow pine double side sills, 2½ x 7 in. and 2½ x 5⅞ in. with a 12 x ⅜ in. steel plate sandwiched in between; oak end sills, 4⅜ x 7½ in. and intermediate crossings of the same material, 3½ x 5 in. Under each platform are outside platform sills, 3 x 9⅞ in.; center knees, 2¾ x 10⅞ in.; crown pieces, 2¼ x 18 in.; diagonal braces, 2¾ x 3½ in.; and end crossing braces, 3½ x 5 in., all of oak. In the upper framing both the corner and side posts are of ash with ½ in. poplar concave and convex panels.

Each platform is enclosed with a No. 12 sheet steel dasher extending around its closed side to the



DOUBLE-DECK CARS FOR CAPE TOWN. **Seating capacity**: lower deck, 48, upper deck, 32. Length over platforms, 33 ft. 4 in.; length of each platform, 5 ft. 6 in.; extreme width, 7 ft. 6 in.; height from track to underside of side-sill, 2 ft. 3½ in.; height from underside of side sills over trolley boards, 14 ft. 5¼ in.; track to step, 13 in.; weight of carbody and electrical equipment, 22,000 lb.; weight of trucks, 7,200 lb.

body corner post. On the open side a suitable pipe stanchion is placed in the center of each step opening for the assistance of passengers.

Double sliding doors are located in each bulkhead of the lower deck in a 36 in. door opening. These doors are glazed in the upper section.

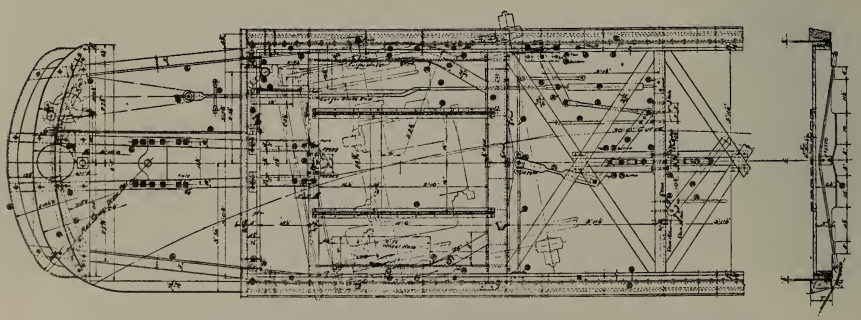
The ceiling in the lower deck is agasote. In this particular also these cars differ from the previous order in which three-ply birch veneer was used. The agasote ceilings are suitably decorated and painted to conform to the appearance of the rest of the interior, which is finished in ash.

Spiral stairways lead to the upper deck, one on each platform, with necessary pipe railings. The bulkhead at each end of this deck is constructed with two windows and a single sliding door, the latter located at diagonally opposite corners of the car body.

A noteworthy feature found in the upper deck is the Brill Reversible "Waylo" type seat, upholstered in rattan. This seat is of particularly light weight; in fact, it is the standard seat of the lightweight Birney Safety Car. In the closed section of the upper deck there are eight (8) seats of this type and a stationary back seat at diagonally opposite corners opposite the door openings, accommodating 36 passengers. In addition, inside the bulkheads, a stationary seat backed against each bulkhead and three (3) single seats on each platform, two of which fold up, increase the seating capacity of the upper deck to 48. All seats outside the bulkheads are constructed of ash slats.

In the lower deck 14 reversible-back spring-covered canvas-lined rattan seats and 4 stationary longitudinal seats, one in each corner, seat 32 passengers, which with the upper deck gives a total seating capacity of 80.

Roof is of plain arch type, with $\frac{3}{8}$ in. poplar roof boards, and supported on wooden and concealed steel rafters. The roof carlines and boards form the ceiling for the upper deck. Suitable pipe stanchions support the hoods at



Double-Deck Cars for Cape Town. Wood is principally used in the underframe, yellow pine double sills with a steel plate between, end sills and crossings of oak being the most important members



Double-Deck Cars for Cape Town. Window arrangement of both upper and lower decks is identical. The use of light-weight Brill "Waylo" seats in the upper deck eliminates considerable weight. This seat weighs but 30 lb.

each end. On top of the roof suitable yellow pine trolley boards are located.

Included in the equipment of these cars are many Brill Specialties, including "Dedenda" Alarm Gongs, "Retriever" Signal Bells, "Dumpit" Sand Boxes, Radial Drawbars, Angle Iron Bumpers and Ratchet Brake Handles.

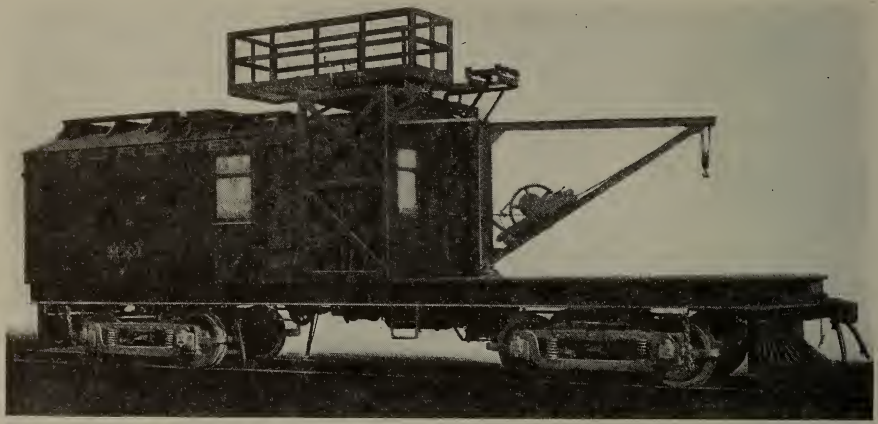
The Brill No. 22-E Maximum Traction Trucks upon which these cars will be mounted have 4 ft. wheel base, 33 in. driving and 22 in. pony wheels, 2 7/64 in. tread and 5/8 x 13/16 in. flange.

There are also under construction for this Company at the present time in the Brill Works two (2) 32 ft. Single-deck Closed Cars, to be mounted on Brill 76-E trucks. Underframes will be all-steel, with angle and plate side members and channel center sills and crossing members.

The seating capacity will be 56 passengers, the seats to be of the "Waylo" type, with stationary cushions.

When completed these cars will be fully described in a future issue of Brill Magazine.

The 50-ft. "Peter Witt" type car, of which so many have been built by our Cleveland plant, The G. C. Kuhlman Car Company, is undoubtedly the ideal car where the traffic is so heavy that practically a moving sidewalk must be maintained. Wide end-entrance and center-exit doors absorb large crowds in very quick time. Peter Witt, the designer of this car, himself recently in a test counted 70 passengers entering one of these cars in Cleveland in 57 seconds.



WORK CAR FOR CUBA. First of new equipment furnished for electrified Cuban steam line. Shipped on its own wheels. Mounted on Brill 27-MCB-2-X trucks

Equipment for Electrified Hershey Cuban Railway

One (1) Work Motor Car
Ten (10) 37 ft. 4 in. Closed Motor Passenger Cars
Three (3) 37 ft. 4 in. Combination Pass. & Bagg. Motor Cars
Two (2) 49 ft. 3 in. Combination Bagg. & Mail Motor Cars

BRILL 27-MCB-2X TRUCKS

THE Work Motor Car illustrated was shipped recently on its own wheels by The J. G. Brill Company to Compania Ferrocarril Cubano de Hershey, Central Hershey, Cuba, via Key West, Florida, over the Cuban All-Rail Route.

Central Hershey, where the vast plantation of the well-known Hershey chocolate and cocoa interests is located, is situated in Havana Province, midway between Havana and Matanzas on the north coast of Cuba, on the Gulf of Mexico. It has been served for several years past by the Hershey Cuban Railway, a 35-mile steam line, which is now in the process of electrification and extension. When all installations of necessary equipment are completed and extensions made, service will be maintained between Havana and Matanzas, a distance of 56 miles, for the transportation of sugar, local freight and express, as well as multiple-unit electric passenger trains on an hourly headway schedule. Including all spurs, sidings and extensions, when completed, this railway will consist of some 80 miles of track.

In addition to the Work Car just shipped, there are several other types of equipment under construction at the Brill Works at the present time, including ten

(10) 37 ft. 4 in. Closed Motor Passenger Cars, three (3) 37 ft. 4 in. Combination Passenger and Baggage Motor Cars, and two (2) 49 ft. 3 in. Combination Baggage and Mail Motor Cars, all of which will be mounted on Brill High-speed Trucks, 27-MCB-2X.

Both the straight passenger and the combination passenger and baggage cars will have all-steel underframes, including angle side sills securely rivetted to 3/32 in. sheet steel side plates up to the belt rail, and channel center sills and cross members. All corner, side and vestibule posts will be of oak. The combination baggage and mail cars, however, while having steel underframes consisting of side sill angles and channel center and crossing members, do not have the steel side plates, the upper framing consisting of ash side and corner posts sheathed on the outside with tongue and grooved yellow pine boards. This equipment practically represents the entire initial equipment of the electrified line, and when completed the various details pertaining to each type will be published in BRILL MAGAZINE.

As may be seen in the illustration, this Work Car is designed and equipped for the handling and transportation of heavy as well as light materials. Therefore, its underframe is of suitable substantial steel construction, with side and center sills of 12 in. 12.50 lb. channels as its principal longitudinal members, to which 6 and 12 in. channel crossings are securely fastened with steel brackets. In addition to these steel members there are three (3) intermediate sills of yellow pine, 2½ x 3¼ in., and steel diagonal braces, 3 x ⅜ in., which reinforce the construction of the underframe sufficiently to withstand the most exacting service it will be called upon to meet.

The closed portion of the upper structure covers half the car's length, 23 ft., and will be used for the smaller materials to be transported on the car. Unlike the underframing it is constructed entirely of wood, having for its side and corner post members yellow pine, 2¼ x 2¾ in., which have vertical poplar sheathing and letter



WORK CAR FOR CUBA. Interior of closed compartment finished in standard freight car style. Mechanism for manual operation of elevating platform and crane in rear corners



Work Car for Cuba. Front end closed compartment showing motorman's position. Suitable tool box located on car floor

boards on the outside. Some of the rails between the vertical posts are of oak. All construction details were left to the experience and judgment of the builders, subject to the approval of the purchasing railway company.

At the forward end of this compartment the vestibule is equipped with a single swinging door in the center with a window on each side. The two single window sash drop into pockets. Another swinging door is located on one side of the rear partition beside a window fitted with double sash, the upper stationary and the lower arranged to raise. There is also a window of this same type on each side of the compartment and, in addition, there is a window to the motorman's right, which is equipped with single sash which drop into the side pocket.

The interior is finished in the regular freight car style, having suitable poplar sheathing on both sides and at ends up to a point just below the window. At the right-hand front end a section is partitioned off with pipe rails on stanchions for use as a motorman's cab. The window rest is cushioned for the comfort of the motorman in leaning out of the window when necessary. On the floor against the side-wall there is a tool box, 6 ft. long x 2½ ft. wide x 15 in. deep, in which necessary repair tools may be kept.

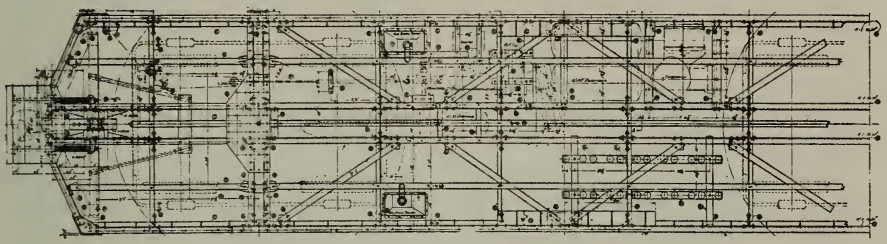
A movable platform is located on top of this closed compartment which can be elevated to such a height as will enable a repairman to reach a wire 23 ft. above the head of the rail. The elevation of this platform or tower is manually controlled by a mechanism operated from within the closed compartment. This platform is also so arranged that it may be swung by the repairman on the roof to either side and is of such a length that a repairman is enabled to work on cross-wires 7 ft. distant from the outside of either rail. With this platform this work car can very well be used in placing poles in place along either side of the tracks.

On the open section of this car there is installed a crane of the stationary boom type, one-ton capacity, which is of such a length

that it will easily reach a point 7 ft. from the outside of the rail, and which is manually operated by a mechanism located within the closed compartment.

It may be noted that a wooden pilot reinforced with steel is located on each end and also that suitable stirrup type freight car steps are located at advantageous points of this car. As shown in the exterior illustration, safety chains are attached to the car and the ends of the trucks.

The Brill 27-MCB-2X trucks on which this car is mounted have 6 ft. wheel base, 4⅛ x 8 in. journals, and are equipped with 33 in. diameter wheels.



WORK CAR FOR CUBA. The substantial steel underframe includes channel side and center sills and channel crossings securely bracketed together. Length over corner posts, 28 ft.; length over ends, 42 ft. 5 in.; extreme width, 8 ft. 6 in.; height from track to underside of side sills, 3 ft. 0¼ in.; height from underside of side sills over roof, 9 ft. 0½ in.; weight of carbody, including electrical and air equipment, 40,350 lb.; weight of trucks, 16,500 lb.

That the motor passenger bus has a place in the transportation world will not be denied by any one, but that place is not in competition with the electric street railways. Some street railways have found a few particular streets where they can use and are using this type of vehicle to advantage, but conditions in other cities will not warrant such an installation.

As a feeder to steam lines and in outlying rural districts yet to be developed to a point where electric lines could be profitably operated, it is well suited, but not in cities served by electric street railways. As a developer of transportation in cities, we recommend the Birney Safety Car.

Twenty Single-Truck Closed Cars for Finland

BRILL 21-E TRUCKS

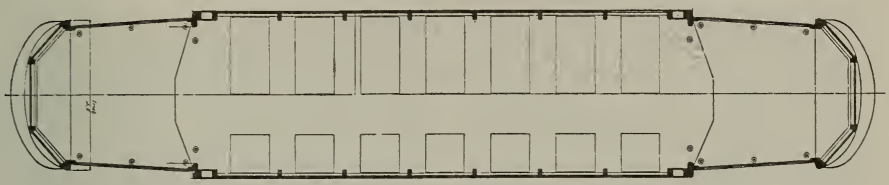
THE J. G. Brill Company a few weeks ago shipped twenty (20) 18 ft. 7 in. Closed Motor Cars, mounted on Brill 21-E Trucks to the Helsingfors Tramways Company, Helsingfors, Finland.

This shipment constitutes the first order for tramway equipment received from Finland since that country became a Republic by its declaration of independence in December, 1917.

Helsingfors, the capital and chief commercial center, is also the principal seaport, being situated on the Gulf of Finland and connected by steamer service with the principal Baltic ports. Among the commodities manufactured and exported are forest products, pulp and paper, and dairy machinery. Its population, consisting of some 150,000 people in the last census of 1910, is progressive, and the development of education to a remarkably high standard now bespeaks its rapid growth. The National University is located in Helsingfors, as well as many other educational and scientific institutions. The city is beautifully laid



Single Truck Cars for Helsingfors. Seven double reversible-back "Winner" type cherry slat seats on one side of the aisle and seven single seats on the other give a total seating capacity of 21 passengers. Upper sash are stationary while the lower are arranged to raise



SINGLE TRUCK CARS FOR HELSINGFORS. Length over platforms, 31 ft. 1 in.; length of each platform, 6 ft. 3 in.; extreme width, 6 ft. 6¾ in.; height from track to underside of side sills, 2 ft. 6¾ in.; height from underside of side sills over trolley boards, 8 ft. 0 in.; weight of carbody, including electrical and air equipment, 20,860 lb.; weight of truck, 6,300 lb. **Seating capacity, 21**

out, with wide streets, boulevards and parks, and in addition there are many historic monuments.

The new cars are particularly noteworthy on account of the 6 ft. 3 in. platform at each end enclosed with four-part folding doors in two sections, one section folding out against the body corner posts and the other against the vestibule posts. Doors and folding steps are manually operated either from a lever located against the vestibule in front of the motorman or on a stand in the open bulkhead where the conductor is located. Twelve standing passengers can be accommodated on each platform and, as 21 passengers can be seated in the car, this gives a total carrying capacity of 45 passengers. Passengers are not permitted to stand in the car-body aisle, which is left clear for the passengers moving to and from their seats. Each platform is also equipped with six pipe stanchions, 3 on each side at the door openings, which serve as grab handles for in-coming and outgoing passengers.

Wood is the principal material used in the underframe construction, yellow pine being used for the side and center sills and oak for the end sills and crossings. The side sill members are 4¾ x 5⅞ in. and the center stringers 4¼ x 5 in., reinforced with a steel angle 6 x 3½ in. The oak end sills are of 3½ x 6⅜ in. and the crossings 3¼ x 5⅞ in. All members of the underframe are substantially joined together and secured with tie rods.

The upper structure is constructed with ash corner posts, 3⅝ in. thick; ash side posts, 2¼ in. thick, with concave and convex panels of poplar.

The Brill plain arch type of roof, which extends the full length of the car, is also considerably lighter than the monitor deck type with deck sash on the sides. It is supported on wooden rafters 1⅛ in. wide over each side post in combination with concealed steel rafters 1¼ x ⅜ in., and ⅞ in. wide between posts.

Seven body windows on each side are enclosed with double sash. All upper sash are framed in one-piece and are stationary, while the lower sash can be raised. The end of each platform is enclosed with stationary vestibule having three

windows, the single sash of which all drop into pockets behind the dasher. For the convenience of the motorman, the center of the three vestibule sash may be held at various heights, it being equipped with a suitable rack for this purpose. Below the vestibule windows the dasher on the outside is of 1/16 in. steel and 3/80 in. steel on the inside.

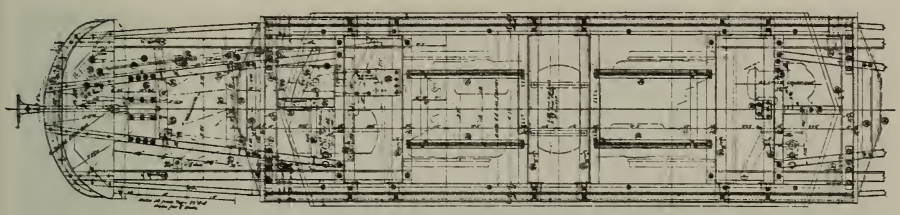
The absence of bulkheads in the body ends not only eliminate the usual sliding doors, but permit quicker access to the car body and at the same time there is an appreciable saving in weight, which is a most important feature. For the assistance of passengers and also as a support a pipe stanchion on each side of the body end extends from over the end sills up to the leaders.

The interiors are handsomely finished in cherry, including all doors and window sash as well as the other interior woodwork. Agasote is used for the ceilings in the body proper, but the platform ceilings are of carline finish. Each side wall between the belt rail and the floor is also covered with agasote.

The seating arrangement consists of but seven (7) transverse cherry slat reversible-back seats with 36 in. cushions for two passengers on each side of the aisle, and on the other seven single seats, with 18 in. cushions, of the same general type, giving a total seating capacity of 21 passengers. All seats are constructed with the celebrated Brill "Winner" Mechanism, and have one-piece pressed steel pedestal and aisle plates. The slats in both the cushions and backs are so arranged that alter-



SINGLE TRUCK CARS FOR HELSINGFORS. Mounted on Brill 21-E truck. Large platform at each end accommodates 12 standing passengers each, giving a total carrying capacity of 45. Doors and steps are controlled by suitable levers from the conductor's and motorman's positions



Single Truck Cars for Helsingfors. The wooden underframe has yellow pine side sills, and end sills and crossings of oak securely joined together and reenforced with suitable tie rods

nately there are dark and light slats, giving the seat somewhat of a unique appearance.

In addition to the seats, the following Brill Specialties are included in the equipment of these cars: "Dumpit" Sand Boxes, Drop Ratchet Brake Handles, "Dedenda" Alarm Gongs, Channel Iron Bumpers, "Retriever" Signal Bells, and "Exhaust" Ventilators.

The standard Brill Single Trucks, No. 21-E, on which these cars are mounted, are constructed for 3 ft. 3⅛ in. track gage, and have 7 ft. wheel base and 31½ in. diameter wheels. As shown in the illustration, a substantial wooden wheel guard extends completely around the truck.

This truck is one of the most widely known single trucks throughout the world. For many years it has given such general satisfaction that but very few changes have been made in its design. It has the widest distribution of any type of Brill truck.

This issue of "Brill Magazine" is devoted principally to descriptions of equipment built for export to South Africa, Spain, Finland and Cuba. But it must not be forgotten that a considerably large amount of Birney Safety Car orders are passing through our shops at the same time.

The American Car Company, St. Louis, where the Birney Safety Car was first constructed, is still engaged in meeting the demand for this type. In fact, their production is 100 per cent. Birney Safety Cars.



Center-Entrance Cars for Barcelona. Mounted on Brill 27-MCB 1 trucks. Second class compartment on one side of central platform and third class compartment on the other. Central platform doors and sliding steps are manually operated from the conductor's position. Constructed with plain arch type roof

All-Steel Center Entrance Cars for Spain

BRILL 27-MCB TRUCKS

THE most recent equipment constructed by The J. G. Brill Company for the Cataluna Tramways, of Barcelona, Spain, consisted of twelve All-steel Center-entrance Motor Cars, mounted on Brill 27-MCB1 Trucks, shipment of which was made a few weeks ago.

Ferrocarriles de Cataluna, S. A., is an interurban line operating westward through the Province of Cataluna from Barcelona, a distance of approximately 18 miles. Several other types of equipment previously have been built for this same tramway, including two (2) interurban passenger cars described in the March, 1913, issue of Brill Magazine, three (3) Construction Cars described in the November, 1913, issue and a third-class trail car described in the May, 1914, issue, as well as several combinations passenger and baggage cars.

All previous passenger cars built for this tramway were constructed with end platforms, but the equipment just shipped was designed with double doors on each side located just beyond the center for entrance and exit of passengers.

The central platform divides the car into two compartments, one for second-class passengers and the other for third-class passengers. A suitable partition separates the second-class compartment from the central platform and also from the other part of the car. There is no partition between the third-class compartment and the platform, an arrangement of vertical and horizontal pipe railings being used

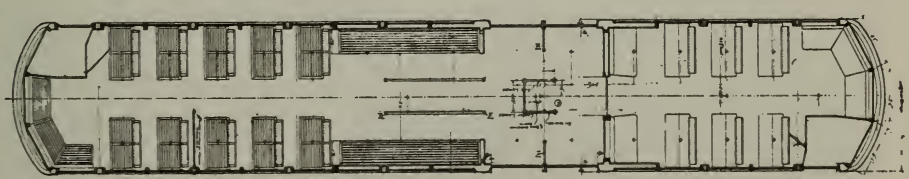
in directing the incoming and outgoing passengers.

These cars are mounted on the celebrated Brill 27-MCB high-speed interurban trucks, and in addition the car bodies are substantially constructed and capable of meeting the requirements of the most exacting service. The steel underframing has for its principal members, side sill angles, 5 x 4 x 3/8 in., extending the full length of the car body without interruption at the central platform, sub-side sills of 3½ x 3 x 3/8 in. angles, which extend from each side of the central platform to the ends; two 5 in. 11½ lb. channel center sills, and also crossings of 4 in. 5¼ lb. channels securely riveted and gusseted to the side sill angles and channel center sills.

In the upperframing the main side posts between windows are composed of two (2) 1½ x 2 x 3/16 in. tees, with inside and outside steel cover plates, while the intermediate posts betwen the two lower sash of each window are of but one 1½ x 2 x 3/16 in. tee section encased with wood. The corner posts and those at the central platform are a combination of a 1½ x 2 x 3/16 in. tee and an angle, 2 x 1½ x ¼ in., with suitable steel cover plates. Below the windows on each side the cars are covered with a 3/32 in. steel sheathing, securely riveted to the underside of the angle side sill and also to the belt rail, side and corner posts. The belt rails are of 3 x ½ in. flat steel bars, and the letter boards of 1/16 in. steel. Attached to the top of each side post and supporting the plain arch type of roof are pressed steel U shape carlines, fitted with a wooden strip for the attachment of the roof boards. Light weight is one of the principal advantages of the plain arch type of roof, and this construction is particularly adapted to its purpose.

The single upper sash over each double window, fitted with beautiful opalescent glass, is stationary, but the two lower sash are arranged to raise. In the end vestibule the sash drop into pockets behind the dasher. Below the vestibule windows on the outside there is a 3/32 in. steel sheathing and No. 20 sheet steel on the inside.

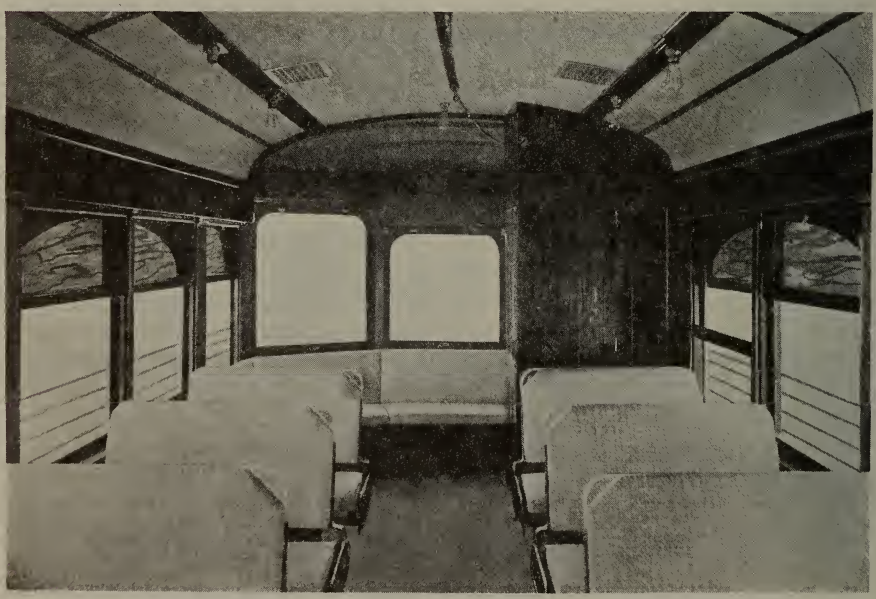
A motorman's cab is partitioned off at diagonal right corners of the



CENTER-ENTRANCE CARS FOR BARCELONA. **Seating capacity,** second class compartment, 20, third class compartment, 34. Length over bumper, 31 ft. 3⅜ in.; length of second class compartment, 15 ft. 9 in.; length of third class compartment, 27 ft. 1½ in.; width center-entrance openings, 6 ft. 3 in. Extreme width, 9 ft. 1½ in.; height from track to underside of side sills, 2 ft. 9⅛ in.; height from underside of side sill over trolley boards, 8 ft. 10⅝ in.; weight of carbody, including electrical and air equipment, 46,864 lb.; weight of trucks, 17,436 lb.; total weight, 64,300 lb.



CENTER-ENTRANCE CARS FOR BARCELONA. Third class compartment equipped with Brill "Winner" reversible-back ash slat seats. Ash is used for the interior finish



CENTER-ENTRANCE CARS FOR BARCELONA. Second class compartment with Brill "Winner" reversible-back seats upholstered in rattan. Interior finish is mahogany

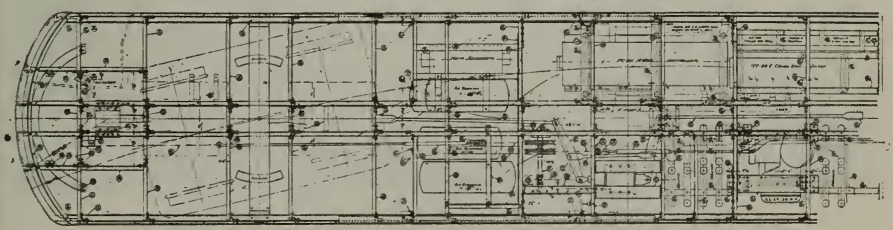
car body, having a swinging door to the motorman's right for entrance and exit and another at his back, making the cab accessible from inside the car. As the side door is glazed in the upper panel a suitable pantasote curtain is provided. A stirrup type step is installed below for the use of the motorman.

The side doors at the central platform for entrance and exit are manually operated by levers located at the conductor's position. Each door slides into a pocket next the central platform post and is separately operated in conjunction with its sliding step. An important feature of the door and step mechanism is that the doors cannot be opened until the sliding step is fully out, thus eliminating the possibility of passengers being injured due to any step action.

A single sliding door is located in the partition between the second-class compartment and the central platform, which separates this compartment from the rest of the car in a rather exclusive manner.

In the second-class compartment four (4) reversible-back transverse seats on each side of the aisle and a semicircular seat against the front vestibule provide seating accommodations for 20 passengers. All reversible seats in this compartment are of the Brill "Winner" type, spring cushion, upholstered with rattan. The interior of the second-class compartment is handsomely furnished in mahogany.

The third-class compartment is equipped with slat seats, five (5) reversible-back Brill "Winner" type on each side of the aisle, a longitudinal seat for 5 passengers on each side next the central platform and the semicircular seat for 4 passengers against the vestibule, in all seating 34 passengers or a total of 54 for the both compartments. Having the longitudinal seats next the central platform in this compartment not only permits the placing of vertical and horizontal pipe railings, heretofore referred to, leading from the central platform, but also provides additional standing space when traffic is heavy. This is of considerable advantage, especially in view of the fact that the major portion of passengers carried is handled in the third-class compartment. All



CENTER-ENTRANCE CARS FOR BARCELONA. The side sill angles of the all-steel underframe extend the full length of the car, while the sub-side sill angles extend from each side of the central platform to the body ends. The eenter sills and crossings are of channels of appropriate dimensions



CENTER-ENTRANCE CARS FOR BARCELONA. The three single sash in the vestibules drop into pockets. A single swinging door to the motorman's right gives entrance and exit to the motorman's cab, in addition to one at the rear, which makes it accessible from the interior of the car

seats in this compartment are of ash slats, and ash is used for the interior finish.

Ceilings are of agasote handsomely decorated, and below the windows is sheathed with hardwood painted to conform to the interior finish of each compartment.

Many important specialties of the builder are included among the equipment of these new cars, including "Retriever" Signal Bells, "Dedenda" Alarm Gongs and Vertical Brakes.

As in the case of all previous equipment built for this tramway company the pantagraph type of trolley is used.

These cars are equipped for multiple-unit operation, and, as will be noted in the end-view illustration, each bumper is equipped with safety chains.

The Brill 27-MCB Trucks under these cars have 6 ft. wheel base, 33 in. diameter wheels and 3¾ x 7 in. journals, and include Brill "Half-Ball" Brake Hangers in their equipment, as well as such features as the Brill Bolster Guide, Graduated System of Springs and Side Swing Dampener.

This truck has been furnished under all equipment shipped to this company, and is the standard high-speed type of the Builder for interurban service.

The first cars built by The J. G. Brill Company for export were shipped 47 years ago. Today cars and trucks of its manufacture are in operation all over the world.

Standard Birney Safety Car Truck

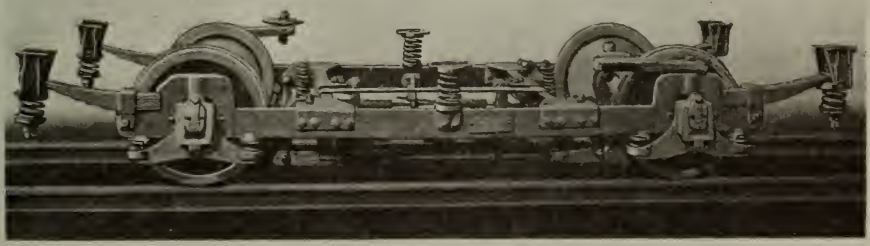
BRILL No. 79-E1

THE present standard truck for Birney Safety Cars, known as Brill 79-E1, was designed and adopted for the purpose of providing a truck for this class of service, which would not only give the rather essential, steady and easy riding action, but which would also have sufficient strength to carry the largest passenger load possible.

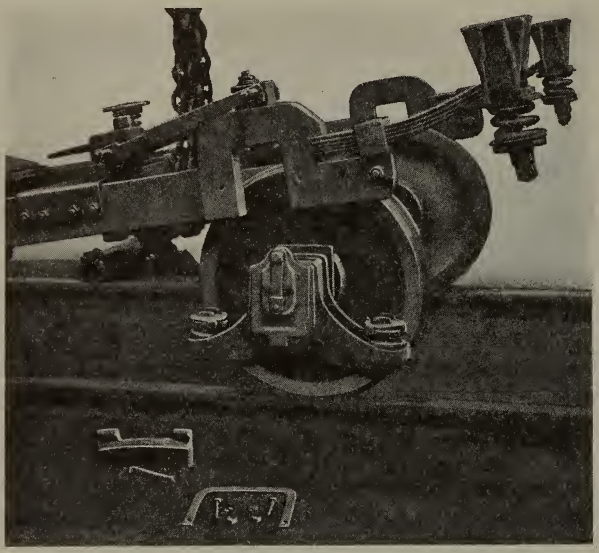
Its predecessor, the Brill 78-M Truck, was designed to carry a limited load and adequately fulfilled its purpose, but in some cases an overloading of the car in excess of this limit resulted disastrously. It was then evident that a truck capable of meeting maximum conditions was required and the Brill 79-E1 was developed as the present standard.

This truck has the celebrated Brill solid-forged sideframes, an improvement over the channel sidebars of the 78-M because of their strength and the firmness which they impart to the construction, and which also increases the steadiness of its riding action. Another important feature is illustrated on page 334, the quick and convenient manner in which the wheels and axles may be removed when necessary. The loosening of a few bolts and the removal of the Pedestal Tie Bars, Brake Shoe Keys and Brake Shoes is all that is necessary.

As does the Brill 78-M Truck, the 79-E supports seventy-five per cent. of weight of car body and passenger load on castings swing-linked to the end of quarter-elliptic springs at its four corners. This permits a spring base 13 ft. long, which with its 8 ft. wheel base, reduces to practically nothing the uncomfortable, oscillating motion produced by ordinary single trucks, in which the maximum



STANDARD BIRNEY SAFETY CAR TRUCK, BRILL 79-E1. Body attachment is at the four corners of this truck, center coil springs and trunnion devices over diagonally opposite pedestals. Supporting 75 per cent. of weight of carbody and passenger load on its four corners, this truck carries the carbody with remarkable steadiness and smoothness of riding action. One-piece sideframes are solid forged



Standard Birney Safety Car Truck, Brill 79-E1. But a few minutes' time is required to remove the wheels and axles from this truck when desired. The removal of the pedestal tie bars and brake shoes is all that is required

portion of weight is supported at a central point which, consequently, acts as a fulcrum to the overhanging ends of the car body. In the 79-E the center coil springs support but a small portion of the weight, simply assisting in cushioning the car body and eliminating jolts and vibrations set up by irregularities in the track surface.

The combination of coil and quarter-elliptic springs at the four corners of this truck permit the cushioning of the car body entirely on quick-acting coil springs. Slower - acting quarter - elliptic springs are not brought into action by the minor vibrations, but where there is a tendency toward excessive motion they exert a restraining influence on the quicker acting coil springs.

At diagonally opposite corners the truck is connected to the car body by a link device located over the pedestals. These links give firmness to the longitudinal direction of the car body, relieve the pressure on the journal boxes under motor and brake pressure and make unnecessary the use of pedestal wear plates. Lateral motion is permitted by this device, but its action is dampened by friction of coil springs on vertical pivots at each end which prevent excessive swaying on straight track, but permit sufficient lateral motion to provide easement at curves.

The Brill 79-E Truck, with wheels and axles, will weigh but 4,300 lbs. It is sufficiently strong to meet the most exacting service, and under the Birney Safety Car it gives the most comfortable riding action.

In fact, the Brill 79-E Truck bears the same important relation to the Birney Safety Car as the chassis to an automobile. To its satisfactory performance is attributed a large measure of the increasing popularity of the light-weight car, and the simplicity and ruggedness of its construction insure long life and low maintenance.

Future Policy of Brill Magazine

THIS issue of BRILL MAGAZINE is the first to come to your desk since that of May, 1918, when its publication was temporarily discontinued.

BRILL MAGAZINE, since its inception in 1907, has always enjoyed an enviable reputation as a reference publication for the design and construction of new electric railway cars, trucks and car and truck equipment. Its importance to the industry has been fully exemplified by the number of inquiries for subsequent issues received following its discontinuance. It was soon realized that it was unfortunate that we neglected to inform BRILL MAGAZINE readers that it was necessary to withhold publication for the following reasons, and you have our apology.

As heretofore stated, BRILL MAGAZINE had a well-defined policy of serving as a reference publication for new electric railway equipment constructed. The adaptation of our facilities to the production of war materials, and the development of the standardized Birney Safety Car caused a scarcity of suitable material for our magazine and, rather than change its well-established character, it was decided to discontinue publication until the termination of the war, at least, when a policy consistent with the conditions in the industry could be formulated.

Most of the larger and specially designed types of cars now being constructed are for foreign shipment, and from present indications the adoption of the standard Birney Safety Car will continue to become more popular not only in this country but abroad as well.

The war, of course, is over, but the general adoption of the Birney Safety Car still limits the number of interesting car types, which are insufficient to resume publication on a monthly basis. It will, therefore, be our policy, commencing with this number, to get out an issue of BRILL MAGAZINE whenever we have suitable material available. By doing this we can keep our readers informed of new types of equipment built and still continue the usefulness of our magazine as a reference publication.

Each issue will bear its volume and issue number which will indicate whether or not consecutive copies have been received.

"Brill Magazine" is sent principally to all those having a vital interest in the electric railway industry.

Many of its readers have a complete file, which they find of value as a reference for the design and construction of electric railway equipment. Do you preserve your copies?

New Brill Foreign Agents

SINCE the last issue of BRILL MAGAZINE, W. R. Grace & Co., Hanover Square, New York, have been selected as Brill Agents for Bolivia, Chili, Ecuador and Peru, South America.

Their extensive organization, with offices in important cities in each of these countries, will facilitate closer relationship with the tramway companies, and thus provide a means of furnishing information and service in connection with Brill equipment.

W. R. Grace & Company's offices are as follows:

W. R. Grace & Co.,
Calle Diez de Medina,
La Paz, Bolivia.
International Machinery Co.,
Calle Morande No. 530,
Santiago, Chili.
International Machinery Co.,
P. O. Box 912,
Antofagasta, Chili.
Mr. Carlas Cardovez, Agent,
c/o Guayaquil Agencies Co.,
Apartado 186,
Quayaquil, Ecuador.
W. R. Grace & Co.,
Merced 620,
Lima, Peru.

Brill Publication No. 245

BIRNEY SAFETY CAR

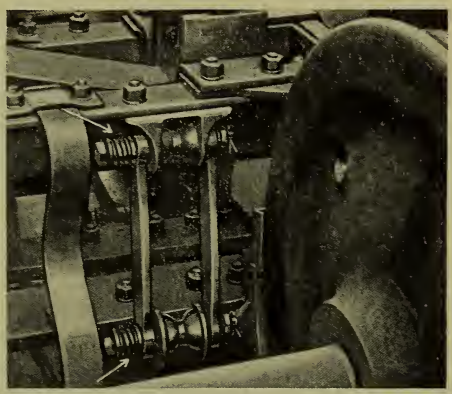
THIS publication contains some very excellent facts and figures on Birney Safety Car operation. On its first and second covers, the exterior and interior views of the Brooklyn Car are reproduced by four-color process in the original colors, a most effective combination, and throughout its pages is information compiled by street railways after operating their Birney Safety Cars in regular service. A request to our *Publicity Department* will bring a copy of this publication to any electric railwayman.

Changes of Address

THERE are liable to be some mistakes in the manner in which this magazine is addressed to you, in view of the long period since the last issue. Will you, therefore, please write any correction necessary on the envelope in which it was received and return it to the Publicity Department, The J. G. Brill Company. Your co-operation will insure receipt of future issues and keep your file complete.

"HALF-BALL" BRAKE HANGER SPRINGS

THE springs on the brake hanger bolts should be properly adjusted at least every six months by screwing the nut and compressing the springs solid, then backing the nut off one-half turn, in order to hold the brake hanger in place by compression. Proper adjustment of these springs will insure long life and satisfactory service.



THE J. G. BRILL COMPANY

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Cable Address: "Brill," Philadelphia

London Office
110 CANNON ST., E. C.
Cable Address: "Axles," London

AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS
Cable Address: "Bogibril," Paris

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AUSTRALASIA—Noyes Brothers, Melbourne Sydney, Dunedin, Brisbane, Perth.

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BOLIVIA—W. R. Grace & Co., Calle Diez de Medina, La Paz.

CHILI—W. R. Grace & Co., Calle Morande No. 530, Santiago.

CHINA—Andersen Meyer & Co., Ltd., 4 and 5 Yuen Ming, Yuen Road, Shanghai.

COLOMBIA AND VENEZUELA—Wesselhoeft & Poor, Bogota, Barranquilla, and Medellin, Colombia, and Caracas, Venezuela.

ECUADOR—W. R. Grace & Co., Carlos Cordovez, Apartado 186, Guayaquil.

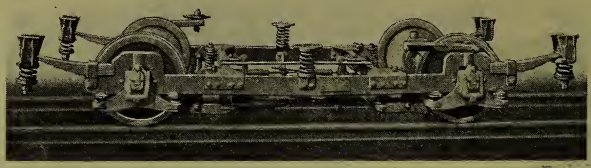
ITALY—Giovanni Chechetti, Piaza Sicilia 1, Milan.

NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons (SA) Ltd., Durban, Natal.

PERU—W. R. Grace & Co., Merced 620, Lima.

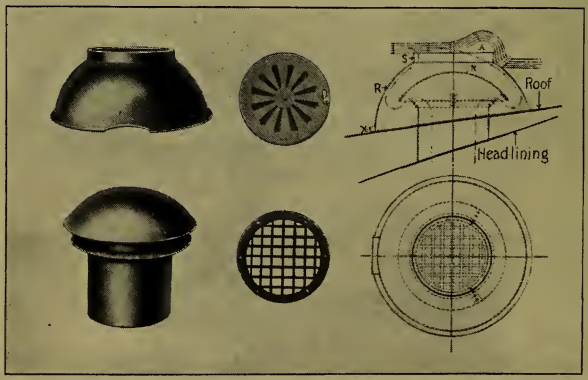
PHILIPPINE ISLANDS, FRENCH INDO-CHINA, FEDERATED MALAY STATES, DUTCH EAST INDIES—Pacific Commercial Company, Manila, P. I.

THE BRILL 79-E TRUCK



SPECIALLY designed to provide a truck capable of carrying the Birney Safety Car and its maximum passenger load with the greatest efficiency, the Brill 79-E has been adopted as the standard truck for this service. Brill solid-forged sideframes, an important feature of its design and construction, not only indicate strength but also insure stability and the most comfortable riding action. When necessary wheels and axles can be removed with the greatest convenience.

THE BRILL "EXHAUST" VENTILATOR



THE Brill "Exhaust" Ventilator for plain arch roof cars is so designed that vitiated or impure air is removed from closed cars when at a standstill and much quicker when in motion. Thus the air in the car is kept constantly fresh. Supplied with either register or grill as desired.

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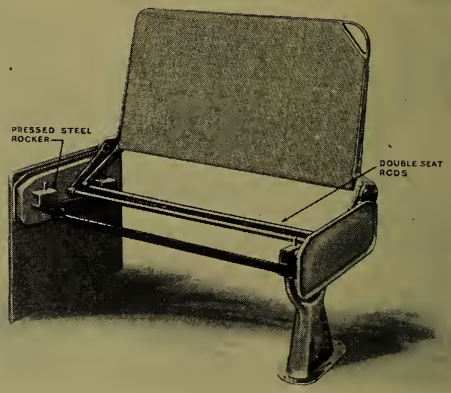


Birney Safety Car,
Baltimore, Md.

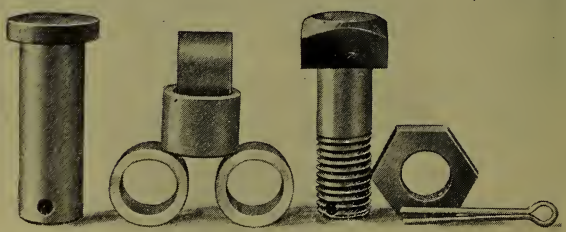
Carolina Rail Bus P.362

BRILL "WINNER" SEAT

PRESSED-STEEL seat rockers, as well as pressed-steel pedestals and wall and aisle plates, are now used in the construction of Brill "Winner" seats. This improvement, together with the use of double seat rods instead of single, gives greater strength and stability to this popular type of seat.



BRILL BRAKE PINS AND BUSHINGS



CASE hardened for wear, Brill Brake Pins and Bushings are particularly reliable. All standard sizes are carried in stock for prompt shipment.



E. W. Walker

General Manager, Terre Haute Division
Terre Haute, Indianapolis and Eastern Traction Co.
Terre Haute, Indiana

Therefore, I see nothing in the immediate future to cause concern or pessimism. The thing for us all to do is to furnish the best possible service at the lowest possible cost, use all the means at our disposal to furnish the maximum of service needed by the community, and not worry about competitors, such as jitney buses. Wherever given an opportunity for expression, the people have indicated that if they are to have but one transportation system, they prefer the street car—but they want, and will pay for, good service.

—E. M. WALKER.

BRILL MAGAZINE

VOL. 11—NO. 12 Copyright, 1921, by The J. G. Brill Company, Philadelphia, U. S. A. JUNE, 1921

E. M. WALKER

EDWIN M. WALKER, General Manager, Terre Haute Division, Terre Haute, Indianapolis and Eastern Traction Company, was born at Workshop, Nottinghamshire, England, March 29, 1875. When a mere boy his family moved to America and settled in Lockport, N. Y., where he obtained his early education, graduating from the High School of that place in 1893.

In 1897 he graduated from Williams College and began his first permanent employment with the Lockport Gas and Electric Light Company, with which company he had been employed during vacations from college. The next year he became Manager of the Gas and Electric Company, Hyde Park, Mass., where he remained until 1903.

Mr. Walker's first connection with the electric railway industry was in 1903, when he was appointed General Manager of the gas, electric and street railway properties at Bristol, Tenn., and Bristol, Va.

From 1907 to 1912 he was General Manager of the gas, electric and street railway properties at Muscatine, Iowa, and from 1912 to 1917 held the same position at Dubuque, Iowa. He accepted the appointment to his present position in 1917.

Mr. Walker is a member of the American Society of Mechanical Engineers and the American Institute Electrical Engineers. He has always displayed an active interest in both national and state electric light and street railway associations.

At the last annual meeting of the Illinois Electric Railways Association Mr. Walker was elected its President for the current year.

The Field for Birney Safety Cars

This standard design of light weight street car not confined to any one kind of service. In large cities as well as small, and in some cases under most extraordinary conditions it has made good—more service at less cost.

THE J. G. Brill Company, and its subsidiary companies, the American Car Company and Wason Manufacturing Company, have received orders to date for a total of 2,961 Birney Safety Cars and, with the exception of those still in the course of construction, shipments of these cars have been made to 168 street railways in the United States, Canada, Mexico, South America, New Zealand and Holland. Indications are that these light-weight, one-man-operated Birney Safety Cars will very rapidly be installed in service in practically every country in the world. In the United States, in most instances, they have been the salvation of those railways having difficulty in keeping their operating costs below their revenue, and it is only logical that the economical operation and revenue-producing features of the Birney Safety Car should appeal to tramway officials abroad, who naturally are



BIRNEY SAFETY CAR IN BALTIMORE, MD. The large cities as well as the smaller ones have readily taken advantage of the improved service rendered by Birney Safety Cars. Eight of the first ten cities in United States according to population now have them in operation.



THE CITIZENS TRACTION COMPANY has had Birney Safety Cars in service for over a year in both Oil City and Franklin, Pa., and from the beginning the service has been most popular. In the illustration passengers are shown boarding one of the cars in Oil City

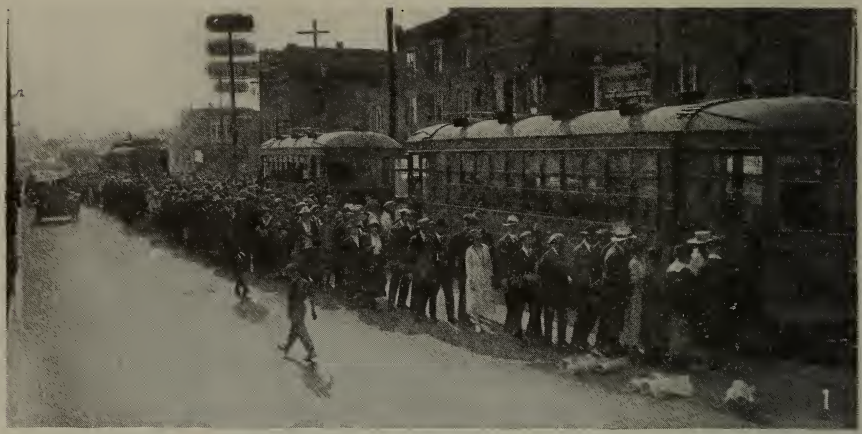
equally concerned in furnishing transportation service at a cost lower than their gross revenue.

A light weight car, which meets general operating conditions everywhere, and which is produced and operated economically, thus enabling the railway companies to install and operate more cars and provide more frequent service, was desired in designing this car. Its accomplishments have been about the same everywhere. Railway companies placing the car in service with the idea of giving better service to their patrons instead of crowding them into less total car space, have been highly successful, and their financial reports clearly show the true worth of the safety car.

The conditions under which the safety cars have been operating have been very diversified. In large cities as well as the smaller ones, through business districts where the travel is heavy, in the less-populated outlying regions of these cities, and in suburban service the Birney Safety Car has given satisfactory service to the public and the railway companies. Such cities as New York, Brooklyn, Chicago, Boston, Detroit, Baltimore, Los Angeles, Toronto and Kansas City have safety cars in service. Many peculiar traffic situations have confronted these standard light-weight, one-man cars, and very often ability to overcome adverse conditions has been found among their qualifications.

QUEUE LOADING IN TORONTO

In Toronto, Ont., Canada, the Birney Safety Car was called upon to meet a most extraordinary situation and the manner in which it handled the problem is now history.







QUEUE LOADING IN TORONTO, CANADA, on large double-truck cars and on light-weight Birney Safeties.

Many years ago the Toronto Railway Company was granted a franchise for the operation of electric street cars within the city limits, but the city expanded and developed its outlying regions. The Toronto Railway Company, however, found it advisable to restrict the operation of their lines to the original plan and it became necessary for the municipality to lay tracks and operate what is known as the Toronto Civic Railway, in order that its suburbs might have adequate transportation facilities. It, therefore, has been the practice for the privately owned company to carry its passenger load to the ends of its lines and there unload for the civic line to pick up the passengers and carry them to their destinations beyond. There was inaugurated under these conditions what is known as the "queue" loading of passenger street cars. The Civic line has had in operation a number of large double-truck, two-man cars, but shortly ago, with the purchase of twenty-five standard Birney Safety Cars, these heavy cars were taken out of service and the little cars installed. The illustrations on page 340 tell the story better than it is possible to describe it. Illustration No. 1 shows the former equipment of the Civic Railway with the two "queue" lines of passengers entering through the front and rear doors. Illustrations Nos. 2 and 3 show the light-weight, one-man Birney cars doing the same thing, the only difference being that one of the two lines of passengers must pass around back of the car and enter on the opposite side through the rear door, which is used at the terminals only.

Of course, the carrying capacity of the safety car is not to be compared with that of the larger car, but by placing more one-man cars in service than had been operated of the double-truck type, the railway company was enabled not only to take advantage of the saving in power and maintenance, but also were enabled to furnish more frequent service on their lines. Of course, Birney Safety Cars are not adapted to trailer operation. Any attempt to operate them as such would only defeat the principle of the car—more cars, shorter intervals and quicker service.

Standardization of car design is most essential to economic production and maintenance, the value of which would otherwise be lost, so the importance of confining construction to the standard design cannot be too strongly emphasized. There are, however, particularly outside the United States, places where consideration must given to traffic conditions which are directly opposite to those prevailing in the United States and which greatly influenced the design of this standard car. Therefore, in order that tramway lines, having conditions different from those in the United States, may not be denied the opportunity of obtaining the benefits attendant upon the operation of Birney Safety Cars, they may be constructed to meet the following varying conditions.



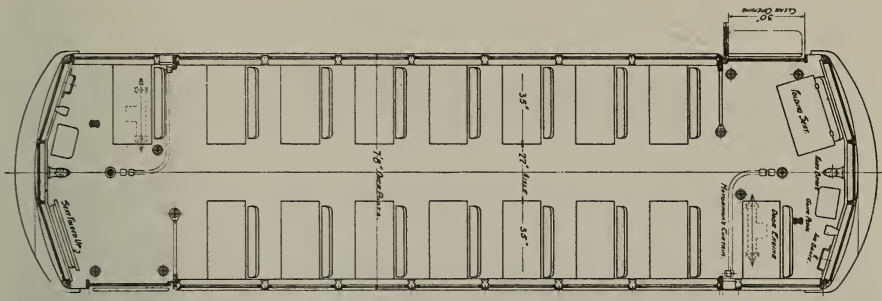
BIRNEY SAFETY CARS FOR BRAZIL. In the city of Pelotas, Brazil, the traffic turns to the left instead of the right. The service doors, therefore, are on the left-hand side

1. For any gauge of track, as narrow as 3 feet.
2. For shipment in sections to economize in cost of overseas shipment, in which case the sections and parts of car body and truck are numbered to facilitate quick assembly upon arrival at destination. However, it is considered advisable that when possible one car at least be shipped complete ready for operation, which may serve as a model for the reassembly of the other cars.
3. With doors at left hand diagonal corners for localities where traffic movement is toward the left instead of toward the right.



BIRNEY SAFETY CARS FOR BRAZIL. Pelotas purchased the Standard Birney Safety Car arranged for left-turn operation. The vestibule folding seat is located under the left vestibule window, and the operator's seat on the right side of the front end

Other changes from the accepted standard may be requested if absolutely essential, but such changes are inadvisable and can be accomplished only at considerably increased cost and a longer period for delivery. Of course, where necessary, the car will be constructed to a minimum extreme width of not less than two meters, which requires a rearrangement of the seating with transverse seats on one side of the aisle, and a longitudinal seat extending

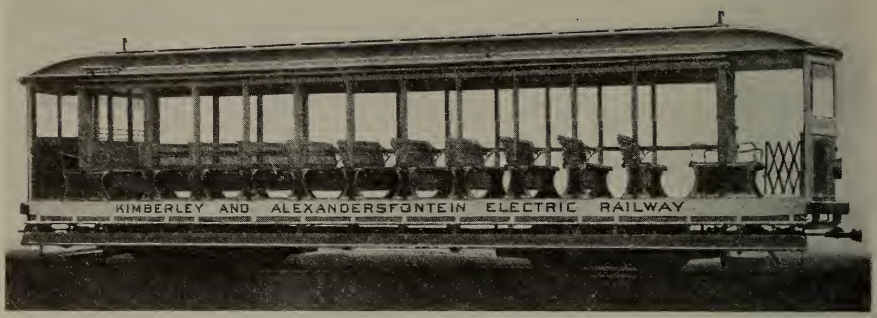


THE BIRNEY SAFETY CAR FOR EXPORT. Seating diagram of double-end car with service doors at diagonally left-hand corners. Seating capacity with standard swing type motorman's seat, 33

the full length of the car body on the other. It is essential, however, to bear in mind that the operating economies and improved service of the Birney Safety Car depend principally upon its light weight, and no change unless actually necessary to the operation of the cars under the local traffic conditions should be requested which will increase the weight of the car and thus reduce the beneficial operating results.

A few months ago two Birney Safety Cars were shipped boxed in sections to Pelotas, Brazil. These cars are illustrated on page 342, and it will be noted that the operating door on the front platform is on the left hand side, with the operator's seat on the right side. With the exception of this provision for conforming to the left turn of traffic and for sectional shipment these cars are of the standard design, with heaters eliminated, as this equipment is unnecessary in Pelotas.

In export business it is not always possible for The J. G. Brill Company to make the arrangements covering the complete ready to operate unit, including the electrical, air brake and safety devices, but due to the close co-operation in the United States between the Brill Company and the companies contributing to the manufacture of these equipments, the purchasing tramway is assured that by combining the independent proposals of Brill and the manufacturers of the electrical equipments, air brakes and safety devices, the complete unit will be received.



FOURTEEN BEACH OPEN CARS FOR SOUTH AFRICA. Mounted on Brill No. 76-E Trucks. Seating capacity, 70; length over body corner posts, 30 ft. 9 in.; length of platforms, 4 ft. 4 in.; centers of side posts, 2 ft. 7 in. and 3 ft. 7 1/16 in.; extreme width over steps, 8 ft. 7 in.; height from underside of the side sills over trolley boards, 8 ft. 2 1/2 in.; weight of carbody, less electrical equipment, 13,060 lb.; weight of trucks, 12,300 lb.

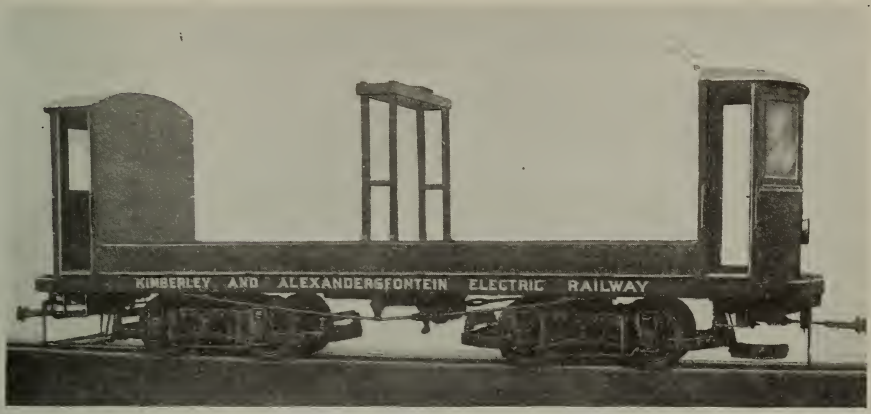
Several Types of Cars for Kimberley & Alexandersfontein Elec. Ry.

SOUTH AFRICA

Six (6) 14—Bench Open Motor Cars
One (1) 30 Ft. Gondola Motor Car
One (1) 35 Ft. Baggage & Express Motor Car
One (1) 40 Ft. Flat Trail Car
Six (6) 21 Ft. Sand Trail Cars
Six (6) 20 Ft. Baggage Trail Cars

WITHIN the past few months there was loaded on an ocean-going steamer, at Philadelphia, a consignment of electric railway equipment for the Kimberley & Alexandersfontein Electric Railway, South Africa. Similar equipment was previously built for the same railway and an article descriptive of the fourteen-bench open cars appeared in BRILL MAGAZINE for September, 1913. It is interesting to note that the first cars purchased by this South African railway at its inauguration in 1905 were constructed by the John Stephenson Company and, commencing with the following year, after the Stephenson Company had become a Brill subsidiary, all new cars purchased by the railway company have been constructed by The J. G. Brill Company in their Philadelphia plant.

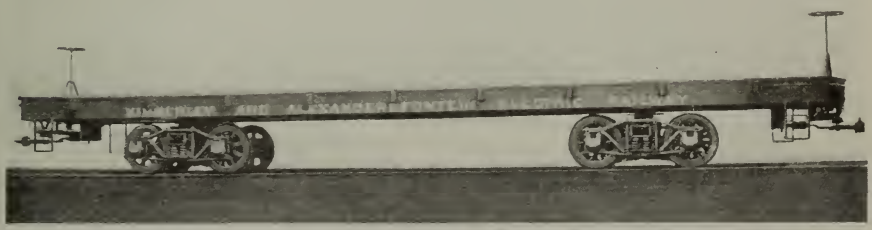
The six fourteen-bench open cars were constructed with wooden underframes of yellow pine side sills, reinforced on the outside with 9x5/8 in. steel plate and oak end sills and crossings. In the superstructure, both corner and side posts are of ash, the former being 3 5/8 in. thick and the latter 2 3/4 in. thick. With the exception that they are mounted on Brill No. 76-E-1 trucks, 3 ft. 6 in. track gauge, and equipped with Brill portable vestibules, these cars



GONDOLA CAR FOR SOUTH AFRICA. Length over corner posts, 21 ft. 11 in.; length of platforms, 3 ft. 0½ in.; extreme width, 8 ft. 2¼ in.; height from truck to underside of side sills, 2 ft. 9½ in.; height from underside of side sills over trolley boards, 7 ft. 10¼ in.



SAND TRAIL CARS FOR SOUTH AFRICA. Mounted on Brill No. 21-E Trailer Trucks. Length over end sills, 21 ft.; length over bumpers, 23 ft.; width over sills, 8 ft.



FLAT TRAIL CAR FOR SOUTH AFRICA. Mounted on Brill No. 55-G Trucks. Length over ends, 40 ft.; extreme width, 8 ft.; height from truck to underside of side sills, 2 ft. 9½ in.; truck wheel base, 4 ft. 6 in.; diameter of wheels, 30 in.; journals, 4½ x 8 in. MCB. Total weight, 26,200 lb.



BAGGAGE AND EXPRESS TRAIL CARS FOR SOUTH AFRICA. Mounted on Brill No. 21-E Trailer Trucks. Length over corner posts, 20 ft.; length of platforms, 3 ft.; length over bumpers, 27 ft. 8 in.; width over posts, 8 ft. 0 in.

are identical with those previously described in BRILL MAGAZINE heretofore referred to. They have a seating capacity of fifty-six, measure 39 ft. 5 in. over platform and are 6 ft. 4 in. wide over side sill plates.

A 30 ft. Gondola car, also mounted on Brill No. 76-E-1 trucks, has a hexagonal-shaped vestibule on each end, which is fitted with two stationary sash and a single drop sash in the center. Each vestibule is sheathed on the back with No. 14 sheet steel. Its underframe consists of yellow pine side sills, plated on the outside with 8x$\frac{3}{4}$ in. steel, and oak end sills and crossings. The sideboards, 12 in. high, are of yellow



BAGGAGE MOTOR CAR FOR SOUTH AFRICA. Mounted on Brill No. 76-E-1 Trucks. There is a single swing door at diagonal left-hand corners of vestibule for the use of the motorman.



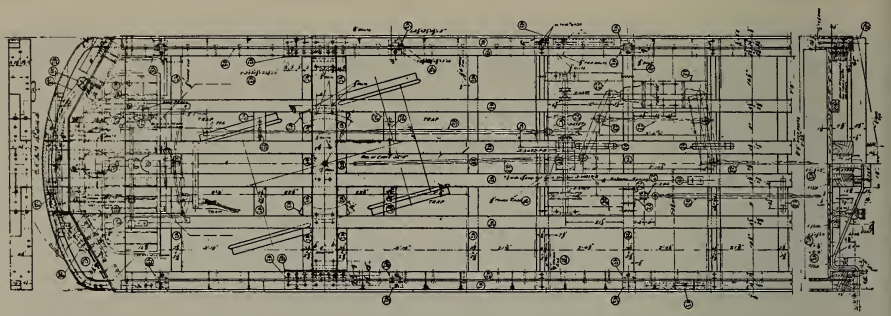
BAGGAGE MOTOR CAR FOR SOUTH AFRICA. Provision is made at each end to protect the motorman against falling packages by the installation of suitable pipe railings extending from the floor to the roof

pine, $1\frac{3}{4}$ in. thick, and for the purpose of raising and lowering are hinged to the side sills. Many Brill specialties, such as brake handles, bumpers, drawbars, alarm gongs and sand boxes, are included in the equipment of this car.

The Six Sand Trail Cars were mounted on celebrated Brill No. 21-E trucks, including solid-forged sideframes, arranged for trailer service. These cars are 21 ft. long over the end sills and 8 ft. wide over the side sills. The underframe consists of yellow pine side sills with oak end sills and crossings. The sides and ends of the car body are of yellow pine, 12 in. high x $1\frac{1}{8}$ in. thick, the sides being hinged, while the ends are stationary. Each end of the car body is equipped with vertical brake shaft, which is operated by a Brill patented "Rachet" brake handle.

The Flat Trail Car, mounted on Brill 55-G trucks was constructed with steel underframe of sufficient strength to support a maximum capacity of 60,000 lb. It is 40 ft. long over the end sills and is 8 ft. wide over the sides.

The 20-ft. Baggage and Express Trail Car bodies are constructed with wooden underframes having yellow pine side sills, $3\frac{3}{4}$x$5\frac{1}{2}$ in.; oak



BAGGAGE MOTOR CAR FOR SOUTH AFRICA. Composite underframe with yellow pine and oak members with steel reinforcement where essential. Length over vestibules, 35 ft.; length of baggage compartment between railings, 28 ft. 5 in.; extreme width, 8 ft.; height from underside of side sills over trolley boards, 8 ft. 10¼ in.

end sills, 4½x4¾ in.; crossings of oak, 3½x5¾ in., with oak platform center knees, 2¾x9 in., and outside platform knees of oak, 4¾x8½ in., with oak diagonal braces 1½x3 in. The corner posts of the upper framing are of ash, 3¼x5⅝ in., with ash door posts, 2¾x4 in. Ash is also used for the body side posts, 2½x3¼ in. Poplar is used for the letter panels, and the side sheathing of the car body is also of poplar, ¾x2½ in. The platform for each end is 3 ft. long and is enclosed with a No. 16 sheet steel dasher, 2 ft. 9½ in. in height, with suitable dasher support extending from platform floor to the underside of roof hood.

The plain arch type of roof is supported by 1½x⅜ in. steel car lines, placed to the best advantage. On each side of the car body there is a single sliding door enclosing a 4 ft. opening.

The following Brill specialties are included in the equipment of these cars, "Radial" drawbar, "Rachet" brake handle, "Retriever" Signal Bell and "Half Ball" Brake Hangers.

The Baggage and Express Car illustrated is the first of this type of equipment purchased by the railway company. It is constructed almost entirely of wood, the underframe consisting of yellow pine side sills, 5¾x7⅞ in., reinforced with 7x⅝ in. steel plate; yellow pine center stringers, 2¾x4½ in. and 4¾x7⅞ in.; oak crossings, 3¾x5⅞ in.; the end sills and crown pieces are also of oak. In the upper framing the corner and door posts are of ash, 2¼x4 in., with side body posts of the same material, 2¼x3 in. The top rail is of yellow pine and the letter panels and side sheathing are of poplar, ¾x2½ in. Each end of the car body is enclosed with a stationary vestibule, hexagonal in shape, sheathed on the outside below the windows with poplar, ¾x2½ in.

The four side windows are fitted with double sash, the upper part of which is stationary and the lower arranged to raise. The center sash in each vestibule is arranged to drop into pockets, while those on the right hand side at diagonally opposite

(Continued on Page 361)

Combination Car for Campinas, Brazil

BRILL 27-MCB-2 TRUCKS

THE J. G. Brill Company a short time ago shipped to Cia Compineira de Traccao Luz e Forca, this combination first and second class passenger and baggage car for operation in the vicinity of Campinas, Brazil.

Campinas is situated in the state of Sao Paulo, about ninety miles from Santos, the principal sea port of that Brazilian coast state. In the city proper there is a population of 43,000, but the Campinas district has a population of about 120,000. Agriculture is the principal occupation of the district and includes the production of coffee, sugar and cotton. A considerable quantity of its products is transported to market on the narrow gauge lines of the Cia Compineira de Traccao Luz e Forca.

The car illustrated is the first closed passenger car shipped by The Brill Company to Campinas, but in the past other types of equipment, such as single-truck open and gondola cars, have been furnished. Some of these were described in the July, 1912, and December, 1916, issues of BRILL MAGAZINE.

This closed passenger car has first and second class compartments, with a short baggage compartment in the center. It is constructed with an all-steel underframe of angle side sills and channel center sills and crossings. A 3-32 in. steel plate extends from the side sills to the belt rail; it is securely screwed and bolted to the side sill angles, belt rail and corner and side posts. All posts in the upper framing are of ash. The dashers below the windows in the vestibule are of sheet steel. Three single drop sash enclose the vestibule windows and the side windows are of the Pullman type, the upper part glazed with opalescent glass extending across two windows, while the



FIRST AND SECOND-CLASS CAR FOR CAMPINAS, BRAZIL. A baggage compartment, 10 ft. 8 in. long, separates the two passenger compartments. Mounted on Brill No. 27-MCB-2 Trucks

lower sash are arranged to raise.

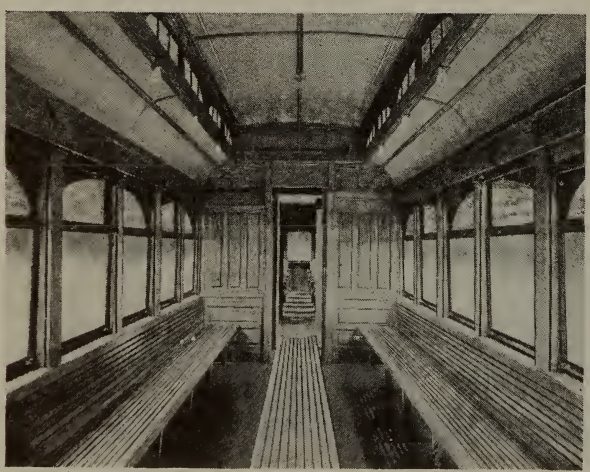
Brill "Winner" transverse seats, upholstered in rattan, are installed in the first class compartment, which is handsomely finished in cherry, stained mahogany. Three yellow pine slat longitudinal seats, one on each side and one in the center, provide seating accommodations in the second class compartment. Yellow pine is also used for the interior finish of this compartment.



COMBINATION CAR FOR CAMPINAS. Interior of first-class compartment toward baggage compartment, equipped with Brill "Winner" Reversible Seats. Interior finish is of cherry, stained mahogany

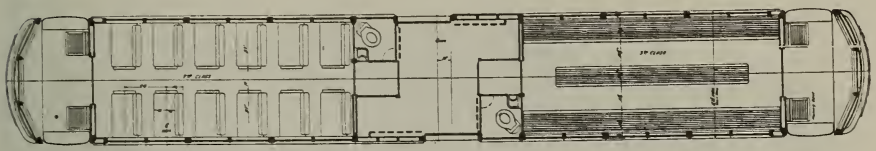
The baggage compartment in the center is 10 ft. 8 in. long, and is entered through single sliding doors, one on each side and one in the center of each partition separating it from the first and second class compartments.

Two single folding slat seats are provided on each end platform, increasing the total seating capacity to fifty-five passengers; the first class compartment having a capacity of twenty-four and the second class compartment a capacity of twenty-seven.

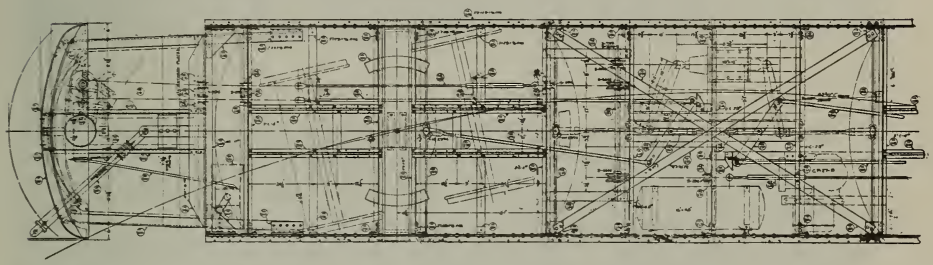


COMBINATION CAR FOR CAMPINAS. Interior of second-class compartment toward baggage compartment. Longitudinal seats are of yellow pine slats. The compartment is also finished in yellow pine

This car is mounted on Brill High-Speed 27-M C B-2 Trucks, equipped with 34 in. diameter wheels and having a wheel base of 6 ft. 6 in. Besides being constructed with Solid-forged Side Frames, which insure strength and greater stability in operation, this truck also includes many important devices which have an important influence on the character of



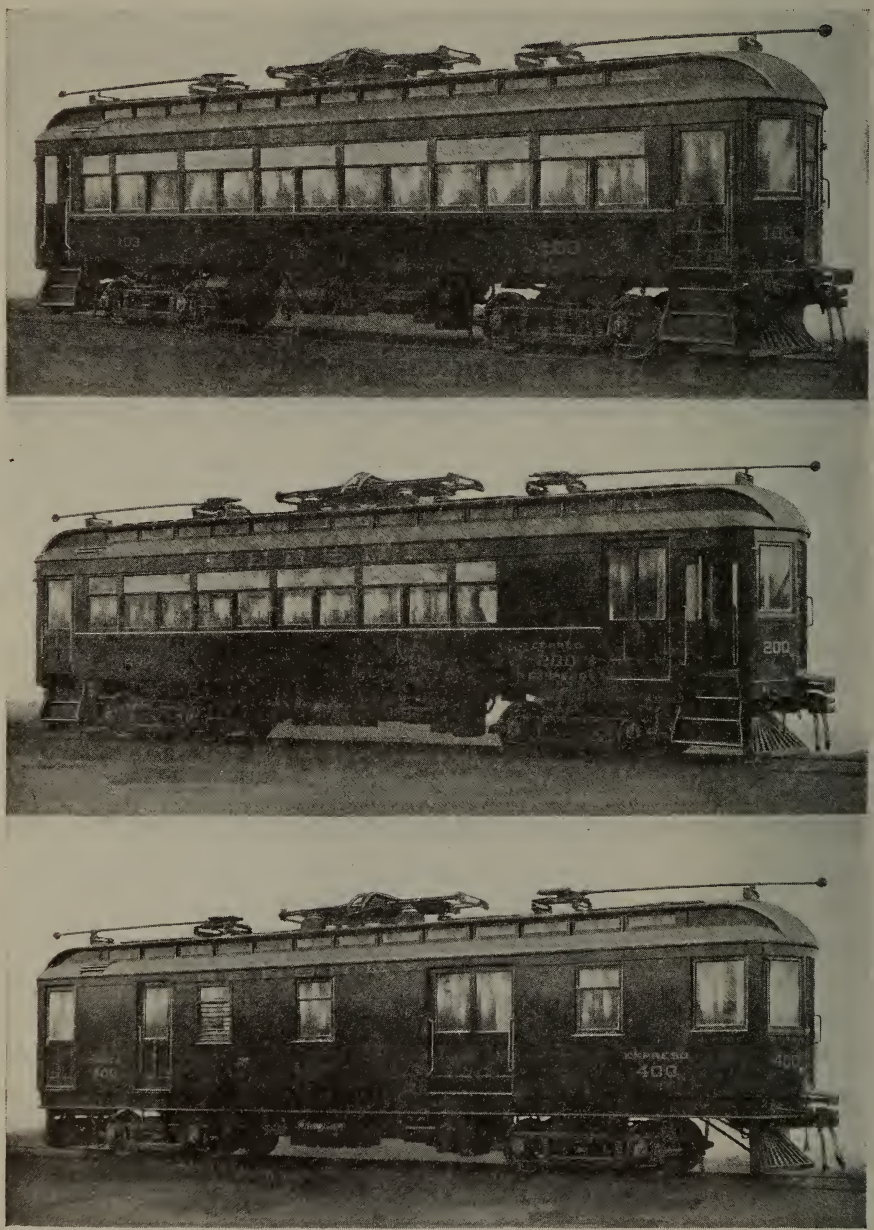
COMBINATION CAR FOR CAMPINAS. Seating capacity of 1st class compartment, 24; 2nd class compartment, 27; on platforms, 4; total of 55 passengers; length over corner posts, 44 ft. 6 in.; length of each platform, 4 ft. 9½ in.; centers of side posts, 2 ft. 8 in.; extreme width, 8 ft., 2¼ in.; height from underside of side sills over trolley boards, 9 ft. 11$\frac{9}{16}$ in.



COMBINATION CAR FOR CAMPINAS. Constructed with all-steel underframe of angle side sills and channel center sills and crossings.

service performed. The Brill Graduated System of Springs guarantees equally good riding under both light and heavy loads. Coil springs are quicker and easier acting than plate elliptic springs and, therefore, in this improved system of truck springs, a coil spring mounted on top of a full elliptic spring under each end of the truck bolster furnishes easement to the riding action when the car body is light. When the passenger load is sufficiently heavy to compress this coil spring solid so that there is contact between its cap and seat the full elliptic spring furnishes the necessary spring action from that point on.

No less important is the Brill Bolster Guide and Side Swing Dampener. The former is a link device which retains the bolster in its vertical position in starting and stopping, thus eliminating annoying and destructive vibrations caused by bolster and transom contact and which would otherwise pass up into the car body. The Side Swing Dampener eliminates excessive side sway, but at the same time permits sufficient lateral motion for easement at the curves.



EQUIPMENT FOR CUBA. Straight Passenger Car (at top), Combination Passenger and Baggage Car (in middle), and Baggage and Mail Car (at bottom), all mounted on Brill High-Speed Trucks No. 27 MCB-2X.

Passenger and Baggage Cars for Electrified Hershey Cuban Railway

BRILL 27-MCB-2X TRUCKS

IN THE June, 1920, issue of BRILL MAGAZINE there was illustrated and described a 42 ft. Work Car, constructed by The J. G. Brill Company for Compania Ferrocarril Cubano de Hershey and shipped to Hershey, Cuba, where the plantation of the Hershey Chocolate Company is located. This Work Car was but a small portion of an order received by the Brill Company for this Cuban railway, and subsequently there was shipped by the same route the three types of electric cars illustrated on the opposite page. This equipment was mentioned in the article referred to above, but, in view of space allowance, details were omitted and, consequently, the important facts relative to the design and construction of these three types of cars are made the subject of another article.

The straight passenger and the combination passenger and baggage cars are of equal dimensions and are identical in construction except that the latter has a baggage compartment fitted with the customary sliding door.

They are constructed with steel underframe consisting of 4x4x5-16 in. angle extending the full length of the car body and riveted to 3-32 in. steel side plates extending up to the belt rails, center stringers of 6 in. 10½ lb. channels and crossings of 4 in. 5¼ lb. channels. In the upper framing the body and vestibule corner posts, side posts and vestibule intermediate posts are of oak. Ash and yellow pine are used for the remainder of the body framing.



PASSENGER CARS FOR CUBA. Brill "Winner" Reversible-back seats with pressed-steel wall and aisle plate and mahogany arm rest provide seating accommodations for 50 passengers

The vestibules at each end are sheathed below the windows inside and out with sheet steel and conform in most particulars to steam car practice. There is a single train door in the center of each vestibule and a window on each side is fitted with double sash, the upper part of which is station-

ary and the lower arranged to drop. All bottom side sash are arranged to raise, while the single sash extending across two windows are stationary.

Each car body end is equipped with a single sliding door, 27 in. opening; there is also a similar door in the partition between the passenger and baggage compartments of the combination passenger and baggage car. On each side of the vestibule there is a single swing door which is used in conjunction with a hinged trap door over the triple steps.



PASSENGER AND BAGGAGE CARS FOR CUBA. Side windows in passenger compartment have stationary upper sash and lower sash which raise. Interior finish, as in the straight passenger cars, is mahogany. Seating capacity, 38

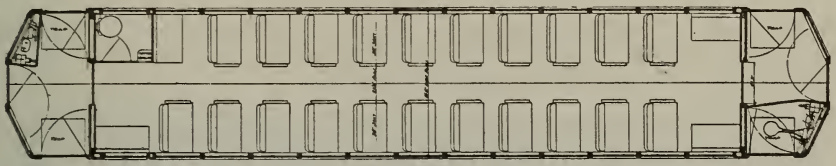
Mahogany is used for the interior finish and the ceilings are of agasote. All transverse seats are of the Brill "Winner" reversible type 38 in. long and in each type of equipment there is an aisle width of 23¼ in. The straight passenger car has a seating capacity of fifty persons, while thirty-eight persons may be accommodated in the passenger compartment of the combination passenger and baggage car.



BAGGAGE AND MAIL CARS FOR CUBA. Length over platforms, 46 ft. 10 in.; width over sides, 8 ft. 6 in.; height underside side sills over trolley boards, 10 ft. 4¼ in.; weight, including elec. and air brake equip., 63,460 lb.; elec. equip. 16,223 lb.; trucks, 29,560 lb.

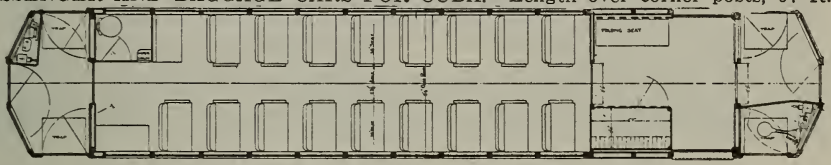
The combination baggage and mail cars are also constructed with steel underframes of 6x3½ x⅜ in. angle side sills, center stringers of 6 in. 10½ lb. channels and crossings of 4 in. 5¼ lb. channels.

The principal members of the body framing are of ash and yellow pine



PASSENGER CARS FOR CUBA. Length over corner posts, 37 ft. 4 in.; length of patforms, 4 ft. 9 in.; center of side posts, 2 ft. 9 in.; extreme width, 8 ft. 9 in.; height underside of side sills over trolley boards, 9 ft. 7⅝ in.; weight of carbody with elec. and air brake equip., 64,280 lb.; elec. equip., 16,223 lb.; trucks, 29,560 lb.

PASSENGER AND BAGGAGE CARS FOR CUBA. Length over corner posts, 37 ft.



4 in.; length of platforms, 4 ft. 9 in.; length of baggage compartment, 8 ft. 5 in.; center of side posts, 2 ft. 9 in.; extreme width, 8 ft. 9 in.; height underside of side sill over trolley boards, 9 ft. 7⅝ in.; weight of carbody with elec. and air brake equip., 65,170 lb.; elec. equipment, 16,223 lb.; trucks, 29,560 lb.

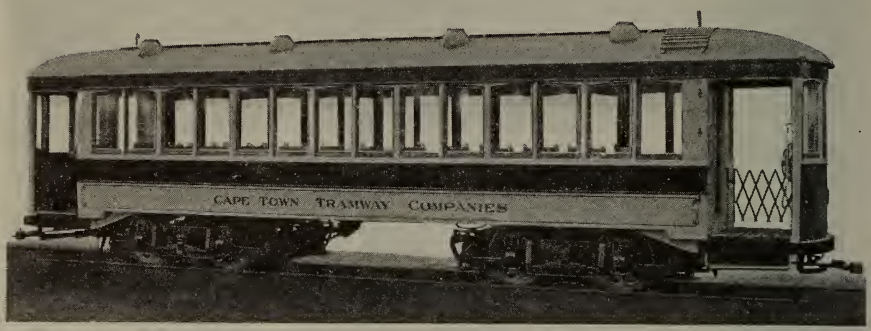
sheathed on the outside with tongue grooved poplar boards. Each body end vestibule conforms to steam railroad practice and has a train swing door in the center with a single drop sash on each side. A separate compartment for the motorman is provided at each end, a hardwood partition with a swing door for entrance and exit providing the separation between it and the mail compartment at one end and suitable pipe railings performing the same function in the baggage compartment end.

The mail compartment is 15 ft. long and is separated from the baggage compartment by a hardwood partition with a creep door under the mail distributing table. In this compartment, in addition to the mail distributing tables, are letter and other mail racks and paper boxes, all of which conform to the United States standard of 15 ft. mail compartment equipment. At one end of this compartment a hopper, folding lavatory and mirror are provided. The windows are fitted with double sash, the upper part of which is stationary and the lower arranged to drop. Also on each side ingress and egress to the compartment is made through a single sliding door 2 ft. 6 in. wide.

The baggage compartment has a single sliding door on each side, 4 ft. 10 in. wide, glazed in the upper part. This compartment is finished in regular baggage compartment style and the ceilings in both the baggage and mail compartments are carline finish with roof boards showing.

All three types of cars illustrated are constructed along the same general lines with steam coach style of roof and sash ventilators. As will be noted in the illustrations these cars were equipped for both double-end trolley pole and pantagraph operation.

The Brill High-Speed Truck No. 27-MCB-2X, with 6 ft. wheel base and 33 in. diameter wheels, was the type selected as best suited for the service on this electrified steam railway.



CARS FOR CAPE TOWN. Mounted on Brill No. 76-E-1 Trucks. Stationary platform steps at diagonally opposite corners only, with pantagraph type gate at opposite side of platform.

Single-Deck Closed Cars for Cape Town, South Africa

BRILL "WAYLO SEATS"

IN the past The J. G. Brill Company has constructed and shipped to Cape Town, South Africa, a number of double-deck cars which have been illustrated and described in the December, 1913, and June, 1920, issues of BRILL MAGAZINE. But the single-deck closed cars illustrated are the first cars of this type the Brill Company has furnished the Cape Town Tramways Company.

Cape Town, the capital of Cape Province and the Legislative Capital of the South African Union is magnificently situated on the northwest extremity of Cape Peninsula on the South Shore of Cable Bay. Behind the bay the impressive wall of Cable Mountains two miles in length rises to a height of over 3500 feet, while on the east and west projecting mountains enclose the plain on which the city is located. Its large harbor, some twenty miles wide, is the destination of many steamship lines, principally from the British Isles, over 6,000 miles away. The population according to the last census was 172,050 mostly Europeans. In 1913 the cities of Sea Point, Queen Point, Woodstock, Maitland, Mowbray, Rondebosch, Clairemont, Kalk Bay and Muizenberg were joined to Cape Town and with other large areas attached give the metropolis a total area of 59.17 square miles. It is also the University City of the Union of South Africa, and is well known for its large and impressive buildings and parliamentary halls.

The two cars in this particular order were mounted on Brill No. 76-E trucks having 4 ft. 10 in. wheel base and equipped with 33 in. diameter wheels. The underframe con-

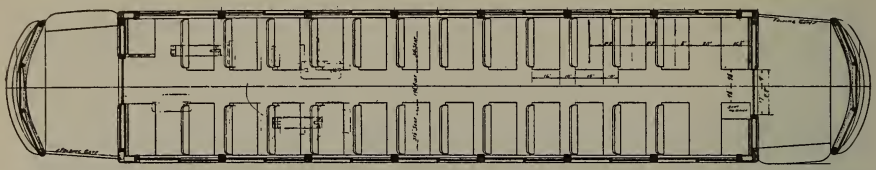
struction is entirely of steel, a 3/32 in. steel plate extending from corner post to corner post, and reinforced on the top by a 3 x 5/8 in. steel plate and at the bottom by a 2½ x 2½ x 3/8 in. angle, end sills of 10 in. 15 lb. channel and end crossings of 4 in. 5¼ lb. channel. The outside platform knees are of 7 x 3½ x ½ in. angle and center platform stringers of 4 in. 5¼ lb. channel extending from the end sills to the bumpers and are securely riveted thereto. In the upper framing the corner and side posts are of ash. Concave and convex channel are of ½ in. poplar.

At each end of the car body there is a stationary round end vestibule with three windows in the upper part and sheathed on the outside below the windows with sheet steel, the center sash being arranged to slide, while that on each side of it is stationary. The sash in the side windows are arranged in pairs consisting of one stationary sash and one sliding sash, the latter moving across the former and so arranged that the stationary sections will be directly opposite to the sliding sections on the opposite side of the car. Each sliding sash is fitted at the top with a sheave arrangement which operates on a metal runway.

The roof is of the plain arched type of ½ in. poplar boards covered with No. 8 canvas. Concealed steel rafters are appropriately placed for



CARS FOR CAPE TOWN. Brill "Waylo" Seats have hinged cushions which raise and facilitate the quick incoming and outgoing of passengers. Side windows have double sash, one half sliding across the other, which is stationary

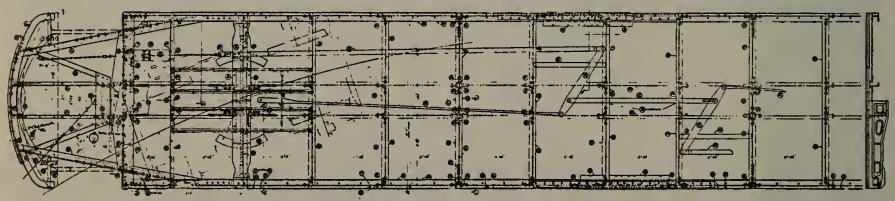


CARS FOR CAPE TOWN. Length over corner posts, 32 ft. 0 in.; length of platforms, 4 ft. 6½ in.; extreme width, 7 ft. 6 in.; height underside of side sills over trolley boards, 8 ft. 6$\frac{11}{16}$ in. Seating capacity, 50.

strengthening the roof construction and to support the trolley apparatus. Eight Brill "Exhaust" ventilators, four on each side of the roof, are provided.

The interiors are finished in ash with agasote ceilings. Seating accommodations are provided by 12 Brill light-weight "Waylo" reversible type seats on each side of the aisle, with a stationary seat at each corner backed against the body end bulk head for a total seating capacity of 56 passengers. The stationary seats at diagonally opposite corners of the car body are constructed with a hinged section arranged to raise. All seats are constructed with cherry slat frames with cushions and backs covered with rattan.

Many Brill specialties are included in the equipment of these cars, the most important of which are the angle iron bumper, "Radial" drawbar, "Dedenda" alarm gong, "Dumpit" sand box, "Half-Ball" brake hanger, Graduated Spring System and Bolster Guide.



CARS FOR CAPE TOWN. Underframe construction is entirely of commercial steel shapes, consisting of 3-32 in. steel side plate with reinforcing plate at top and side sill angle at bottom. End sills, center stringers and crossings are of suitable steel channels

Steam Coaches for Export

BRILL AND WASON PLANTS

IN addition to the construction of both cars and trucks for electric railway operation The J. G. Brill Company and Wason Manufacturing Company have always enjoyed a large and extensive steam car business with steam railroads all over the world. The Wason plant, Springfield, Mass., particularly has produced many cars of varied design, which have had enviable records for long service and minimum maintenance expense. This company was formed in 1845, and during these many intervening years there have been produced from its well-organized and well-equipped carbuilding shops, passenger coaches, parlor cars, dining cars, sleeping cars, and many other types of steam railroad equipment for some of the largest systems in the world.

The J. G. Brill Company is primarily and has long been recognized as the largest builder of electric railway cars and trucks in the United States. Its long experience and the installation in its large plant in Philadelphia of machine tools adapted to steam coach building as well as the electric car naturally has attracted to it many orders for steam railroad equipment. Included among these most recently received was an order for four 37 ft. 6 in. first-class passenger coaches mounted on Brill 60-D all-steel trucks for Compania del Ferrocarril de Amaga, Colombia, South America.

This railroad operates in that section of Colombia which is well known for its agricultural products of sugar cane, grain, coffee, tobacco, and also for cattle raising. The city of Amaga is in the Department of Antioquia, Colombia, about 25



STEAM CARS FOR COLOMBIA. Mounted on Brill No. 60-D Trucks. Substantially constructed with all-steel underframe and wooden upperframing. Practically all equipment operated by this company was shipped from our Philadelphia plant

miles from Medellin, and has a population of about 7,000 inhabitants.

As will be noted in the illustration, these cars are constructed with open platforms 2 ft. 8 in. long, with pipe grab railings at each end, with vertical brake staff and wheel. They are 37 ft. 6 in. long over corner posts and have an extreme width of 8 ft. 6 in. The seating capacity is 54 passengers.



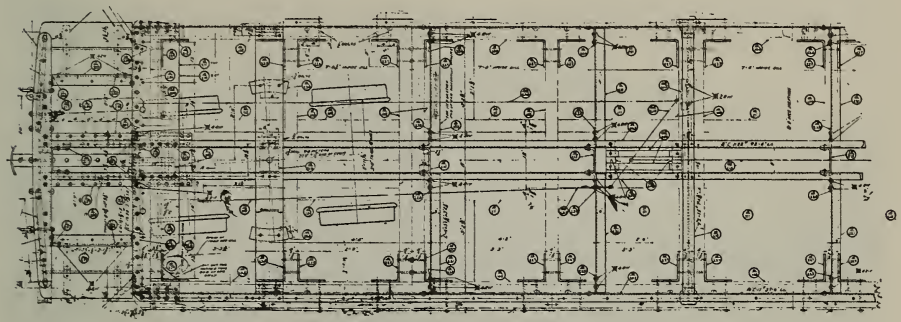
STEAM CARS FOR COLOMBIA. Equipped with Brill "Winner" Reversible Seats with pressed-steel pedestals, wall and aisle plates, and mahogany capped arm rests. Ash slat blinds inclose each window opening

They are constructed with all-steel underframes; the side sills are of 10 in. 15 lb. channels, with 8 in. 16¼ lb. channels used for the end sills. Center stringers are of 8 in. 11¼ lb. channels and steel angles 4 x 3 x 5/16 in. are used for crossings.

Ash is principally used in the upper framing, the corner and side posts being of this material. The outside sheathing of the body is of tongue and grooved poplar boards ¾ x 1¾ in., which are securely screwed to the body frame members.

The 14 windows on each side of the body are fitted with double sash, the upper part of which is stationary and the lower part arranged to raise. There is a single swing door in the center of each body end, with a double window on each side. A saloon is located at one end in the corner, and is fitted with the most modern saloon equipment for steam railroad coaches. A single swing door is provided in the solid wood partition separating this saloon from the main passenger compartment. All doors, linings, mouldings, etc., making up the interior finish are of ash. Agasote is used for the ceilings. There are 12 Brill "Winner" spring rattan, upholstered reversible-back transverse seats on each side of the aisle and a longitudinal seat for two passengers in each corner except that where the saloon is located. On the inside of each window two-part ash slat blinds are provided, which may be raised and lowered.

The Brill 60-D trucks on which these cars are mounted have a wheel base of 4 ft. 6 in., with 24 in. diameter wheels, and are constructed for 3 ft. track gauge.



STEAM CARS FOR COLOMBIA. All-steel underframe of channel center stringers and side and end sills, with angle crossings forms a most substantial type of construction for the intended service. Length over corner posts, 37 ft. 6 in.; length of platforms, 2 ft. 8 in.; extreme width, 8 ft. 6 in.; center of side posts, 2 ft. 6 in. Seating capacity, 54. Total weight, 30,650 lb.

(Continued from Page 348)

corners are stationary. At left hand diagonal corners of each vestibule there is a swinging door glazed on the upper part. In the center on each side of the car body the 5 ft. door opening is enclosed with a single sliding door of the usual baggage door type.

As will be noted in the illustration of the interior on page 347, there is a pipe railing from the floor to the roof immediately behind the motorman, which protects him against falling packages. The interior finish is of ash.

The plain arched roof, extending the full length of the car is strengthened with $1\frac{1}{2}$x$\frac{3}{8}$ in. steel rafters, so placed as to relieve the strain of the trolley apparatus to the best advantage.

Gasoline-Driven Motor Omnibus and Trailer for Rail Operation

BRANCH STEAM LINE SERVICE

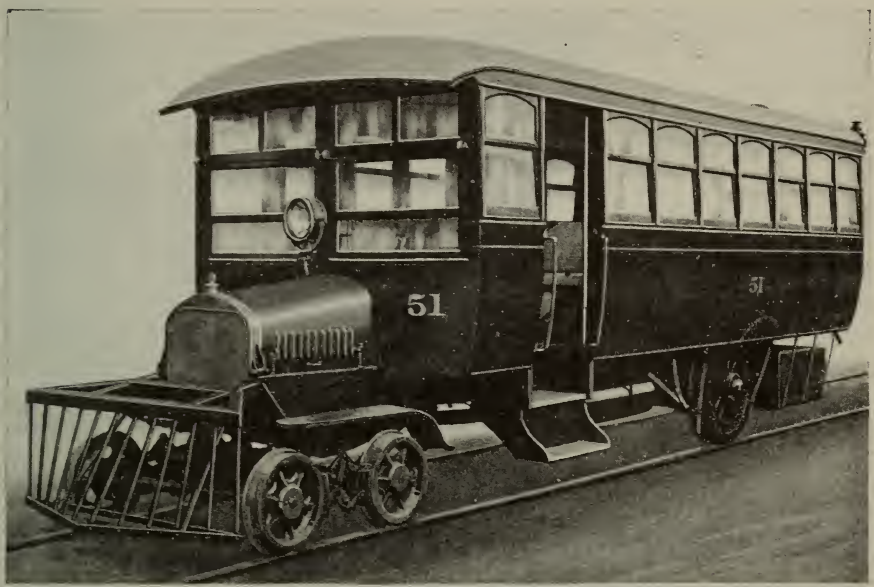
RAILROAD officials, particularly those executives who are more or less concerned about making branch steam lines more of a success financially, will be interested in the possibilities in this direction offered by the gasoline-driven motor omnibus and trailer illustrated, built by The J. G. Brill Company. This substitute for the steam locomotive and coach on branch or short main lines is recommended by its builders because of the apparent low cost of operation, not to speak of the comparatively low initial cost. Its possibilities are so great that a most thorough investigation is warranted by interested railroad officials; in some cases a revision of schedules to provide more service has shown surprising results in the way of a larger number of passengers carried and increased gross revenue.

As to its cost of operation per mile, we believe it is sufficient for us to say that it is so low as to excite the interest of most railroad officials whose lines can use equipment of this character to advantage. Actual figures compiled by one railroad are of little value to others due principally to the wide divergence of operating conditions and for this reason it was considered advisable not to attempt to present any in connection with the cost of operation of this gasoline rail car and trailer. It is evident, however, that, where the excessively high operating cost of the steam locomotive and coach makes the continuation of service almost prohibitive, the substitution of this gasoline rail car will not only permit the same service at less cost, but offers an opportunity to improve both the service and earnings. Provision may be made for the handling of baggage and express, either in conjunction with the motor car or on a special trailer designed for the purpose.

With this type of vehicle a maximum speed of 30 miles per hour may be obtained, and when required the trailer will carry a load at least equal to the load of the motor car without materially decreasing the speed of the latter. So much for what it does. Let's see what it consists of.

In the first place its chassis is equipped with flanged rear wheels for rail service and the front end is mounted on a specially designed pony truck. This pony truck adheres better to the rails under high rates of speed, especially on curves, and consequently more comfortable riding action results.

The single motor car illustrated at top of page 263 was built for the Chesapeake Western Railroad, a 40-mile line operating between Elkton and Stokesville, Virginia, and is mounted on a 2½ ton chassis, having 4 transmission speeds both forward and reverse. In addition to



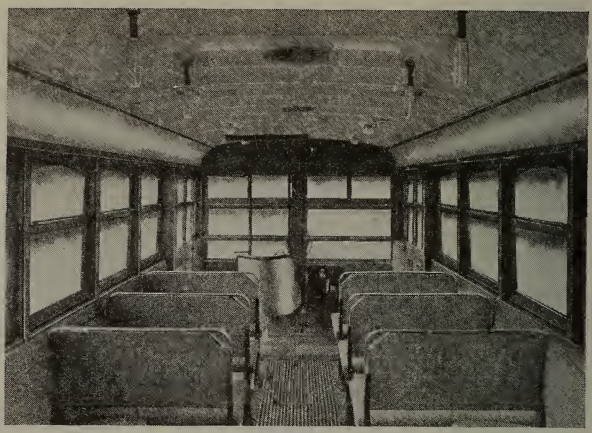
GASOLINE RAIL MOTOR CAR FOR CHESAPEAKE WESTERN R. R. Specially designed pony truck under forward end stabilizes the riding action and under high rates of speed adheres better to the rails. A large box for carrying luggage is located under rear end

the system of brakes on the small pony front truck, which is controlled through the shaft and wheel used for steering in regular motor bus practice, the speed of the bus is also retarded by the application of brakes on the rear wheels and also on the transmission. Convenient to the operator's position there is a foot pedal which controls the operation of rear wheel brakes and to his left there is a lever which applies the transmission brake.

Its body was constructed according to the best body building practice with a composite underframe of ash side and end sills and crossings of 3 in. steel channels, ash corner and side posts in the superstructure with No. 18 sheet steel side sheathing up to the belt rail. It measures 21 ft. 11 in. long over corner posts, 7 ft. 10½ in. wide over side posts at belt rail and has a seating capacity of 31 passengers. Eight standard Brill light-weight "Waylo" stationary seats, two side longitudinal seats for 4 passengers each, a long seat extending completely across the rear end for 6 passengers and one single corner longitudinal seat, all upholstered in Brill twill-woven seating rattan, constitute the available seating space for passengers.

The interior is of a sanitary ash finish with roof carlines showing, and in appearance greatly resembles the electric street car, the seats, floor mat strips, ventilators, hand straps attached to the ceiling and many other details conforming to the equipment and construction characteristics of that type of ve-vehicle. All side and end sash

are of the double type, the upper part being stationary and the lower arranged to drop into pockets. The front is enclosed with wind shield, which is hinged and opens outwardly.

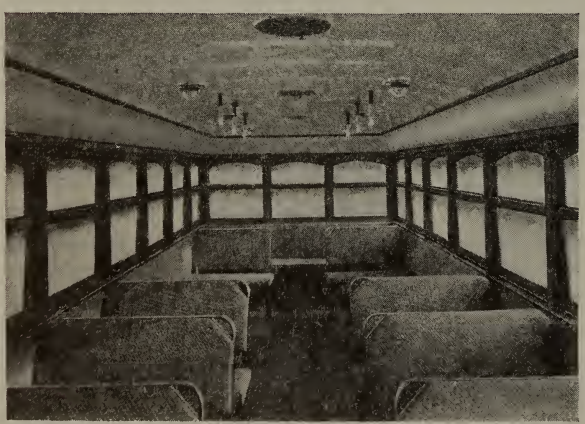


GASOLINE RAIL MOTOR CAR FOR C. W. R. R. The use of Brill "Waylo" Non-Reversible Rattan-upholstered Seats, Brill "Exhaust" Ventilators in roof, hand straps and floor mat strips give this motor omnibus a decidedly electric street car appearance

The two leaf folding doors which enclose the door opening on each side of the forward end are controlled by manually operated levers located in front of the operator's position, a separate lever being used for each set of doors.

As in regular motor omnibus practice the heating of the motor car is through the "exhaust" from the engine.

The roof is of the plain arch type and contains three standard Brill "Exhaust" ventilators. This ventilator will be recognized as that type which has been pretty generally used in electric street cars and which through years of service has been found capable of quickly removing the impure air without subjecting the passengers to draughts.



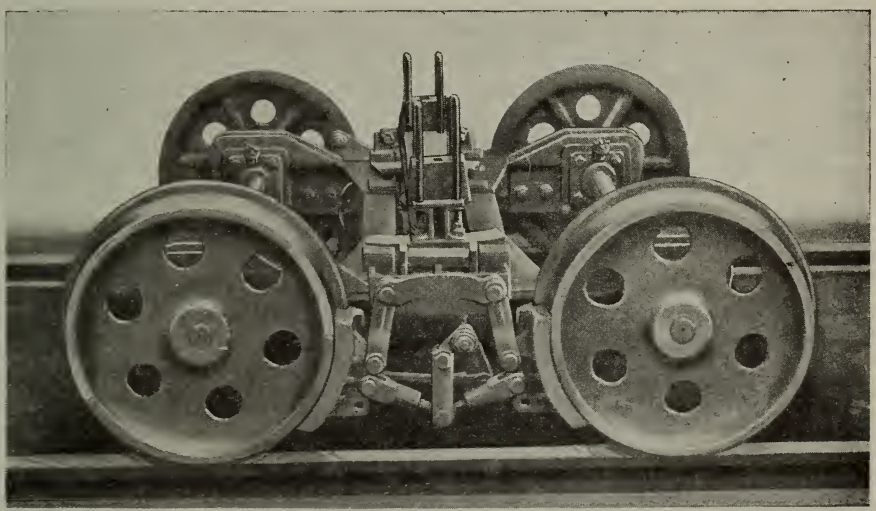
GASOLINE RAIL MOTOR CAR FOR C. W. R. R. Upper part of all side and end sash are stationary, with lower arranged to raise. Seating capacity, 31

Under the rear end strapped to the bottom of the underframe is a large wooden box with hinged cover and lock for the hauling of luggage.

The small pivotal pony truck under the forward end is constructed of commercial steel shapes and has a 3 ft. wheel base. It is equipped with 20 in. diameter wheels having MCB

standard width tread and thickness of flange. The distance between the rear axle and center of this pony truck is 16 ft. 6 in. A pilot is attached to the front end of the chassis as a safeguard against obstructions on the rails which might cause derailment.

The illustration at top of page 367 shows a motor and trailer constructed for the U. S. Engineers for operation at Camp A. A. Humphrey, Va. The motor bus is practically the same as heretofore described, with the baggage box and front pilot



PONY TRUCK FOR GASOLINE RAIL MOTOR CAR. Constructed with 3 ft. wheel base and 20-in. diameter wheels having MCB standard width of wheel tread and thickness of flange. System of wheel brakes is controlled by the staff and wheel ordinarily used for steering

eliminated, and the trailer is the same in many details. The latter has a seating capacity of 35 due to the fact that there is no operating mechanism in the forward end, making the combined seating capacity of the two-car unit 66 passengers, which is larger than the capacity of the usual steam coach. Directly in front of the seat across the forward end is an "emergency" brake staff and drop ratchet handle, which, as is the case with all emergency brakes, is used only occasionally when circumstances demand it. Also, this trailer is mounted on a type of special running gear, equipped with 30 in. diameter wheels and having an 8 ft. wheel base, which has been in operation on many street railways in the United States and abroad. The two buses are coupled together by a Brill "Radial" drawbar and the signal cord extends through both buses, enabling the conductor on the trailer to signal the driver of the motor bus.

As economical operation was primarily the reason for the development of this gasoline-driven railroad motor omnibus and trailer, and as the number of miles per gal-

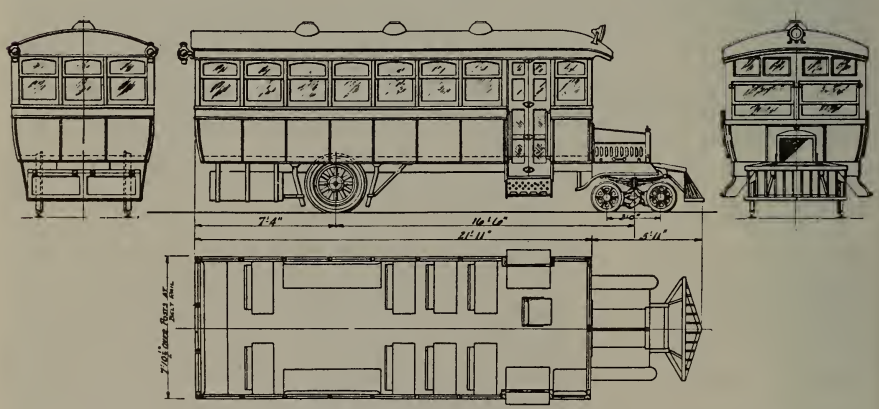
lon of gasoline is influenced largely by the weight moved, every effort was made to secure the lightest construction for the service. Consequently, the motor car complete weighs approximately 12,000 lbs. and the trail car complete about 6000 lbs. One motor car in regular service averaged as high as 14 miles per gallon of gasoline. Capacity of engine, 45 horsepower.

Since the development of this economical unit and the practical demonstration of its capabilities, the Brill Company has been called upon to design many different types of bodies, to meet the character of service which branch steam railroads are rendering in various localities under their particular local conditions.

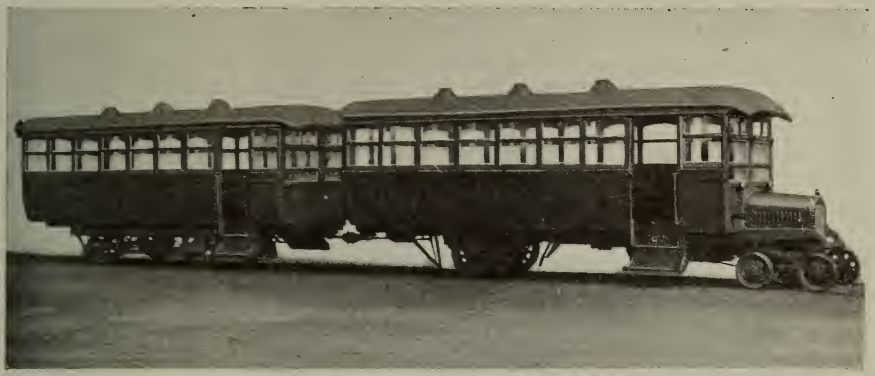
For instance, there has been designed several types of combination passenger and baggage railroad motor omnibuses, with accommodations for 21, 26 or 29 seated passengers and having baggage compartments of from 4 ft. 6 in. to 6 ft. 6 in. in length. In each type, of course, provision is made for the handling of the baggage through a suitable side door so that the passenger and baggage compartments are entirely separate, the same as in any combination passenger and baggage steam coach. In the largest unit a chassis is used which has a 22 ft. wheel base, while the other two are designed for mounting on chassis having the same wheel base as the passenger bus illustrated.

In addition to these, a combination passenger and freight motor omnibus body has been designed which provides for 21 seated passengers in the closed body and for hauling the freight on a 7 ft. 3 in. rear platform with stake sides. Regular freight car stirrup type steps afford a means of boarding this rear platform. For railroads where the quantity of freight is in excess of that which could be handled in this freight platform, the question of individual freight trailers has been gone into and suitable bodies designed to meet requirements.

Some branch lines find it necessary to have facilities for handling



GASOLINE RAIL MOTOR CAR FOR C. W. R. R. Length over corner posts, 21 ft. 11 in.; length over pilot, 27 ft. 10 in.; width over posts at belt rail, 7 ft. 10½ in.; center of rear wheel to center of pony truck, 16 ft. 6 in.; centers of side posts, 2 ft. 5 in.; height track to underside of side sills 2 ft. 10 in.; height floor to underside of roof boards, 6 ft. 7¼ in. Seating capacity, 31. Total weight, approximately ,12,000 lbs.

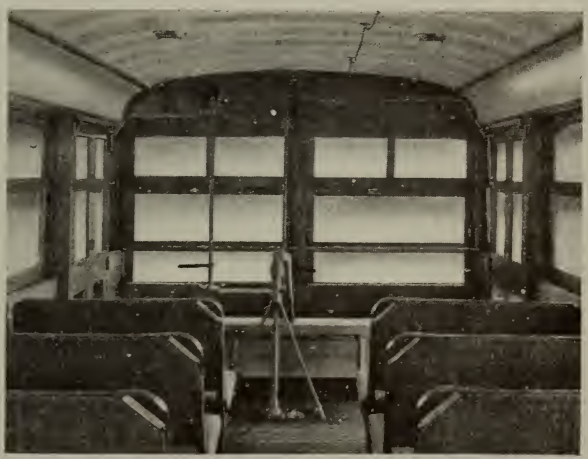


GASOLINE RAIL CAR AND TRAILER FOR CAMP A. A. HUMPHREYS. Trailer is mounted on Brill special type of running gear with 8 ft. wheel base and 30-in. diameter wheel. Weight of motor car, approximately 12,000 lbs.; weight of trailer, approximately 6,000 lbs.

mail en route and, consequently, in their present rolling stock a mail compartment is included. This will be no hindrance to their taking advantage of the economical feature of gasoline-driven motor omnibuses. One particular unit which has already been designed includes a 5 ft. mail compartment in front of a 14 ft. compartment for the handling of baggage and express. In this combination baggage, express and mail railroad motor ombnibus there is also a separate driver's compartment tc which entrance is made through manually operated folding doors on the right-hand side.

Thus practically every type of body has been designed which will enable branch steam railroads to continue their present service, but at a lower operating cost.

Many new extensions of service are now possible on account of the comparatively low initial investment required to install these gasoline rail cars.



FRONT END OF TRAILER FOR CAMP A. A. HUMPHREYS. Front doors are controlled by separate manually operated levers located against the front end of body. An emergency brake with drop handle is also provided. Seating capacity of trailer, 35.

Brill Publication Binders

THE loose-leaf binder system of catalogs has been adopted for all Brill products. Up to the present bulletins have been prepared on all our different types of trucks and other railway equipment, and others are in the course of preparation. A preliminary distribution of binders has been made by our Publicity Department, London Office and Cie J. G. Brill so that many railway officials already have a convenient file of our various bulletins in which they are interested.

We will be pleased to send these loose-leaf binders upon requests from railway officials so that copies of all bulletins which we send them in the future may be preserved for reference.

Cie J. G. Brill's Territory Expanded

SINCE 1908, when the Cie J. G. Brill, Paris, France, was organized for the distribution of our products, it has been our representative in Spain, France and Algeria. Recently the facilities at its command were enlarged, principally in the shape of new Forge, Machine and Assembly Shops and Store Rooms at Gallardon, a distance of forty miles from Paris, and Cie J. G. Brill's territory has been expanded to include Belgium, Italy, Switzerland and Luxembourg.

Mr. C. B. Dubbleman, Brussels, who has been our agent heretofore for Belgium and Holland, will continue to represent us in Holland, and Cie J. G. Brill in Belgium. His address at 19 Rue du Parnasse, Brussels, remains the same.

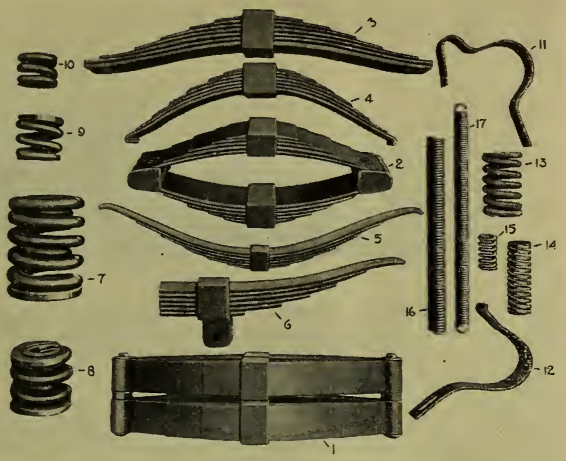
In Italy, Mr. Giovanni Chechetti, Piaza Sicilia 1, Milan, will continue to handle the sale of our products, but as a representative of Cie J. G. Brill.

Changes of Address

THERE are liable to be some mistakes in the manner in which this magazine is addressed to you, in view of the long period since the last issue. Will you, therefore, please write any correction necessary on the envelope in which it was received and return it to the Publicity Department, The J. G. Brill Company. Your co-operation will insure receipt of future issues and keep your file complete.

BRILL TRUCK SPRINGS

THE high carbon, low, phosphorus, open-hearth steel used in the manufacture of Brill Springs conforms to specifications of American Society for Testing Materials (*same chemical analysis as Penna. R. R. standard*).



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CHILE—International Machinery Co., Calle Morande No. 530, Santiago.

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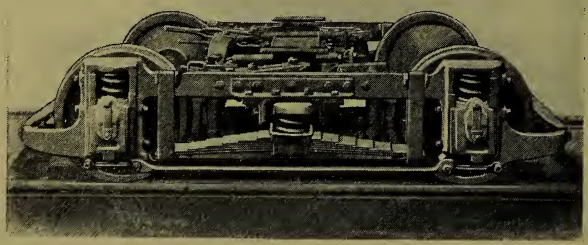
THE BRILL NO. 21-E TRUCK



TWENTY-SIX years ago the first Brill No. 21-E Truck was built. Today this truck enjoys a universal reputation, being in service in more countries the world over than any other type of Brill truck, and is the adopted standard for short-length cars.

Its system of springs is so arranged with slower-acting elliptic springs at each corner that any tendency toward oscillation is eliminated. Its sideframes are solid-forged.

BRILL NO. 77-E TRUCK



THIS 77-E truck for 24 or 26 inch wheels is extremely popular for cars where low heights are essential. Like the regular truck of this type it is a long wheel-base truck with inside hung motors, and has such distinctively Brill features as Solid-forged Sideframes, Bolster Guide and Graduated Spring System.

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